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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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...Promises ...n for Abuse ...SA System

WASHINGTON, D.C. — Legislation setting a minimum mandatory jail sentence for anyone convicted of abusing or vandalizing Social Security Administration (SSA) computers has been introduced in the House of Representatives.

The bill's sponsor, Rep. Ike Skelton (D-Mo.), explained the need for the legislation by pointing to testimony last fall by former SSA officials who complained of continuing vandalism problems at the agency's computer center in Baltimore [CW, Oct. 5]. Skelton also said the General Accounting Office (GAO) will soon release a report on "continuing acts of malicious alteration of Social Security tapes."

The GAO reported in December that 45 acts of apparent vandalism had taken place at the computer center since 1977, Skelton noted. The incidents are not "small pranks" but "malicious acts [which] can cause serious and expensive computer damage."

The computer center maintains records on approximately 200 million Americans and pays benefits to more than 36 million people every month. It is one of the largest DP operations in the U.S.

The bill introduced by Skelton would set a mandatory prison term of three to 10 years with no chance for parole and fines up to $50,000 upon conviction of anyone who "willfully destroys, alters or abuses the equipment, facilities, support systems or material resources . . . vital to the operations of the federal Social Security system," causing more than $500 in damage.

...And Introduces Net 1

AT&T Finally Christens Baby Bell

By Bob Johnson
CW New York Bureau

NEW YORK — Baby Bell has a new name. The long-awaited christening of AT&T's wholly owned subsidiary, created to supply data communications services, took place here last week with the formation of American Bell, Inc.

At the same time, the company introduced American Bell's first offering, a distributed data communications product called the Advanced Information Systems/Net 1, formerly known as AT&T's Advanced Communications Service or ACS.

The announcement came on the heels of the Federal Communications Commission's June 10 approval of an AT&T capitalization plan filed by the company last Nov. 30. Under the Computer Inquiry II decision of 1980 and its revision in 1981, the FCC ruled that AT&T could offer enhanced telecommunications and information services only if it set up a subsidiary that was not funded by AT&T rate payers. American Bell, scheduled to begin operation on July 1, is AT&T's answer to that ruling.

At the press conference here announcing American Bell, AT&T Chairman of the Board Charles R. Brown said the creation of the subsidiary marked the end of a long road toward establishing the Bell system on a footing equal to that of its competitors. The new company will enable AT&T to offer services that "make the fullest use of our technology.

"The merging of telecommunications and computer technology has given rise to a new era — one of deregulation and competition," Brown stated. He added that American Bell and its Net 1 product amply demonstrate a commitment to this new era.

"American Bell's initial offering, Net 1, will do for data communications what the switchboard did for telephone services," Brown declared.

Net 1 will provide businesses with the ability to introduce new data communications systems while continuing to make use of existing DP investments, according to the chief executive officer of American Bell, Salvatore J. Barbera. Net 1 will solve the problems of data networks not being able to talk to one another by allowing previously incompatible hardware components "to do business with each other," Barbera said.

American Bell described Net 1 as a shared distributed communications processing service that is user-programmable and provides nationwide accessibility, data storage and trans-

(Continued on Page 6)

CW Photo by B. Johnson

The chief executive officer of American Bell, Salvatore J. Barbera, explained the Net 1 service at a New York press conference last week.

Message Service From WU Links Incompatibles

McLEAN, Va. — A communications system that reportedly allows incompatible equipment to communicate by interfacing with Western Union, Inc.'s network of satellite transmission systems, electronic mail and high-speed message printers was introduced by the company last week.

The software-based Access system allows the delivery of hard-copy communications to users anywhere in the world, according to Western Union. It can link any communicating word processor, on-line computer terminal or local network, the company said.

The Access system interconnects virtually all hard-copy business com-

(Continued on Page 6)

Terminals, Software Dominate

Over Thirty Graphics Units Bow at NCGA

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — More than 30 products, ranging from programs to peripherals to full-fledged systems, last week made their formal debut at a conference and exhibition sponsored by the National Computer Graphics Association.

Dominating the parade of new graphics-oriented offerings were terminals and software packages, which clearly outdistanced the printer and plotter introductions, at least in sheer numbers.

Hewlett-Packard Co. used the June 13-17 gathering as an occasion to announce a graphics software package for the company's HP 3000 business systems series. The package consists of:

• Easychart, a module that report-

(Continued on Page 8)

CW Photo by J. Beeler

Some of the 30,000-plus attendees at the National Computer Graphics Association conference last week cooled their heels during a Computervision product demonstration.

Bank Swindler Gets 10 Years

By Jim Bartimo
CW Staff

LOS ANGELES — What was reportedly the largest bank embezzlement in U.S. history — the swindling of $21.3 million from the Wells Fargo Bank computer system — ended in the sentencing earlier this month of the former head of Muhammed Ali Professional Sports, Inc. to 10 years in jail.

Harold Rossfields Smith, who was found guilty of the scam in January, was also fined $30,000.

As head of Muhammed Ali Professional Sports, a highly successful

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COMPUTERWORLD
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Sprinklers to Blame?

Explosions Rock IBM Disk Plant

By Robert Batt
CW West Coast Bureau

SAN JOSE, Calif. — A series of violent explosions rocked an assembly plant at IBM's manufacturing complex here last week injuring 18 people and causing damage estimated to be in the multimillion-dollar range.

The cause of what fire fighters described as "a tremendous, tremendous explosion" was not initially known, but one of the San Jose Fire Department's theories is that IBM's in-house automatic sprinklers were to blame.

The San Jose complex employs 8,500 people, but the explosions occurred on a Sunday when only a few people were on the site. Most of those injured were released after treatment at nearby hospitals. However, Robert Pagaduan, a 33-year-old plant security guard had to be hospitalized for second-degree burns on his legs, face, chest and neck.

The assembly plant manufactures magnetic disks for IBM's 3370 and 3375 systems. Company officials refused to release production figures, but claimed that manufacturing was not held up by the incident.

Devastating Blast

The blast left a scene of devastation with smoke billowing hundreds of feet into the air and shook buildings more than a mile away from the plant. Residents as far as 10 miles away reported hearing the explosions.

"I've never seen damage like this," San Jose Fire Capt. Jerry Hubbard said. "If this had happened any day but a Sunday we would have taken hundreds to hospitals. I don't know why we didn't have a few people killed just by flying glass."

Initial estimates set damage at more than $1 million, but fire officials think it may reach two or three times that figure. The cause of the explosion immediately became a subject of controversy. The San Jose Fire Department said it believes the blast was caused when water thrown on a small fire in a trash bin came into contact with highly explosive magnesium.

Hubbard said two maintenance workers were sawing through pipes on the roof of the assembly building and unknowingly allowed hot metal fragments to tumble down into two large trash bins below them. The waste containers were filled with an aluminum powder containing 4% magnesium.

The workers raised the alarm and Hubbard speculated that about this time an automatic sprinkler went off, dousing the bins containing the magnesium scrap with water. Magnesium explodes when mixed with water.

IBM denied that water had been used to fight the fire. "Our fire fighters never got a chance to put anything on the fire before the explosions occurred. If we had, we would have used chemicals, not water," said Art Fiacco, IBM site communications manager.

The two-alarm fire was extinguished in about 30 minutes by 32 San Jose fire fighters using 16 pieces of equipment. Despite the rapid response to the emergency, however, severe damage was caused. The explosions and fire gutted a large part of the interior of the building and cars parked nearby were set ablaze by flaming material falling around the plant.

A concrete wall was blown out and several fire-resistant doors and hundreds of windows were destroyed. "On a scale of 1 to 10, this explosion was a 10," Hubbard said.

World Trade Center Power Outage Halts Financial Net Processing

NEW YORK — A loss of electrical power caused an international on-line financial system located in the World Trade Center here to stop operating for more than an hour recently.

The outage, reportedly the result of failure of a Consolidated Edison Co. (Con Ed) main feeder cable serving One World Trade Center, halted processing on Telerate Systems, Inc.'s on-line financial network.

According to the company's computer operations manager, Chuck Coull, power was lost at approximately 2:03 p.m. on Wednesday, June 9, and abruptly caused Telerate's main computer complex at the World Trade Center to halt its Telerate Information System.

The system operates on-line on a 24-hour basis and links some 5,000 terminals as well as other CPUs around the world. The system, which uses Perkin-Elmer Corp. 3220 computers, processes commodity, government notes and treasury notes information for banks and brokerage firms internationally.

"The shutdown effectively caused us not to process any information from our computer sites located in the U.S., Europe and Asia. It also stopped our customers from accessing information," Coull said.

Telerate's master computer complex in New York accepts and processes data from "slave" systems across the U.S., in Hong Kong, London and Zurich. In addition, Coull noted, five other slave systems within New York City also feed into the company's master complex at the World Trade Center.

Telerate could not estimate how much was lost because of the outage downtime and a spokesman stated that customers' leased terminals create "an individual situation." Coull said, however, that the system was up and running about 20 minutes after power was restored.

This Week

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S.D. Governor, Three Other Officials Sued For Breaking Computer Lease Contract

By Jim Bartimo
CW Staff

PIERRE, S.D. — Gov. Bill Janklow is one of four state officials who are being sued for close to $1 million for breaking a computer lease contract.

The seven-year contract was broken last year when the state decided it was paying too much for its IBM 370/158 mainframe. When the original deal was struck, the system was priced at $2.2 million. By the time the contract was broken five years later, it had decreased in value to $150,000 [CW, July 16].

A U.S. Circuit Court of Appeals here recently ruled that American Re-Insurance Co., a Delaware corporation that loaned the money for the leased system to the State of South Dakota, could not sue the state, but it could sue the four individuals involved in the signing of the contract for a total of $900,000 to $1 million.

The state owes approximately $800,000 on the lease, according to Charles McCobb, an assistant vice-president of American Re-Insurance's parent company, Aetna Life and Casualty Co. The original loan was for $2 million.

South Dakota purchased an identical Model 158 mainframe shortly after breaking the contract. "What the state did was to reject the contract on the basis that it was illegal," an Aetna spokesman said. "They went out and bought an identical computer for $150,000 and returned the [first] computer to us."

Officials at Aetna said the devaluation of the equipment is not the issue. "We feel that we entered into a good-faith transaction with them, and now they are ignoring their side of it. We were relying upon the state to honor its lease," McCobb said. "Our decision [to sue the individuals] was strictly a cash-flow decision."

American Re-Insurance was the loaning agent between the state and the leasing company, Computer Investors Group (CIG). American Re-Insurance will seek to recoup its losses from CIG if it does not win its case against the officials, according to the company's legal counsel, Lawrence Piersol.

An anonymous legal source at American Re-Insurance said that Aetna has refused to do business with South Dakota since the contract was canceled. "We will certainly scrutinize future transactions closely," McCobb said.

Janklow called the contract illegal last year and threatened to sue the leaseholder. However, no action has been taken by the state or by Janklow, according to legal sources for American Re-Insurance.

The state officials being sued besides Janklow are Auditor Vern Larson, Commissioner of Administration Tim Engelhart and Purchasing Director James Brinkman. Brinkman signed the contract and Janklow, then attorney general, had reviewed it, McCobb said.

A spokesman for the governor's office said in a telephone interview that none of the four officials being sued will comment while the case is pending.

Wide World Photo

Gov. Bill Janklow

Ten Years Given in Biggest Ever Bank Scam

(Continued from Page 1)

boxing promotion organization, Smith "was [using the embezzled funds] to try and buy up all the fighters in the country — and he came damn close," according to the prosecuting Assistant U.S. Attorney Dean B. Allison, chief of the U.S. Attorney's Special Prosecution Unit. Smith spent some $10 million on fighters' contracts.

"There was virtually nothing left but $150,000 dollars in Smith's bank account" when he was apprehended, Allison said. "He spent $27 million in two years. Virtually all the money went for Smith's lavish lifestyle of cars, airplanes and women."

'Rollover' Scheme

The money was taken through a complex "rollover" scheme of the bank's branch settlement system, which used a two-part credit/debit ticket. Smith withdrew a sum of money from the bank branch where co-conspirator Ben Lewis worked. Lewis used a pirated code from another branch to falsify a credit to Smith's account whenever a debit occurred. Lewis matched the pirated half of the ticket with the actual withdrawal half from Smith.

The pirated code came from an employee of another Wells Fargo branch, Sammie Marshall, who left the bank and joined Muhammed Ali Professional Sports shortly after turning over the code.

The nature of the scam forced Lewis to roll over the credit/debit ticket every 10 days. Although the tickets were processed through the bank's computer, "none of the other branches of the bank were getting any paper on this," Allison said.

The ever-escalating scheme might have continued indefinitely if Lewis had not mistakenly filed an improper credit entry in early 1981. By the time all three conspirators were apprehended, 2,500 falsely matched tickets had been fed into the bank's computer.

"We're pleased that justice has moved along," a Wells Fargo spokesman said, "but we're not prepared to make any comment." The bank announced changes in the accounting system soon after the scam was uncovered, the spokesman said.

Bank officials had denied that the embezzlement was computer-related [CW, March 2, 1981], but a week later admitted to the nature of Lewis' involvement [CW March 9, 1981].

Smith was convicted in January on 29 counts, including aiding and abetting embezzlement and interstate transportation of money taken by fraud. His lawyer, Howard Moore Jr., could not be reached at the address given by the American Bar Association.

In addition to a jail sentence of 10 years and the fine of $30,000, Smith must serve five years of parole after the prison term, including a mandatory 3,000 hours of community service, Allison said.

Lewis was sentenced to five years in prison after pleading guilty and appearing as a key witness in the conviction of Smith. Marshall was sentenced to three years in prison for his role in the embezzlement scheme.

Allison was satisfied with the punishment for Marshall and Lewis, although his office recommended a 25-year term while the parole board recommended a 20-year term. Why did Smith receive 10 years for what Allison called "the largest bank embezzlement in U.S. history"?

"That's one you'll have to address to the judge," he said.

DPMA to Hear Blumenthal

CHICAGO — W. Michael Blumenthal, chairman of the board of Burroughs Corp. and former U.S. Secretary of the Treasury, will be the keynote speaker at the Data Processing Management Association (DPMA) conference and business exposition when it is held here Oct. 17-20.

Fifty seminars, workshops and special sessions related to information processing managment functions are planned for the show. They will be organized into five tracks: "Managing Others," "Information Management/Technical," "Future Information Directions," "Information Management/Concepts" and "Managing Self."

The registration fee is $325 for DPMA members and $375 for nonmembers who sign up before Sept. 17.

More information is available from the DPMA Conference Manager, DPMA International, 505 Busse Highway, Park Ridge, Ill. 60068.

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Scientific High-End Additions

Gould Speeds Up 32-Bit Concept Mini Line

By Tom Henkel
CW Staff

FORT LAUDERDALE, Fla. — The SEL Computer Systems Division of Gould, Inc. announced two high-end additions to its Concept 32/87 line of 32-bit superminicomputers, claiming that the processors are the fastest 32-bit minis currently available.

Aimed at scientific, engineering and computer-aided design and manufacturing users, the processors use the same bus architecture and operating system as the firm's entry-level 32/8705 CPU. The new top-of-the-line 32/8780 incorporates a parallel central processor and a multi-streaming feature, while the mid-range 32/8750 uses a single CPU with an integral floating-point processor, the vendor said.

Both processors are designed to operate in a Fortran-oriented scientific environment. Typical applications include large-scale simulations, weather modeling and statistical or number-crunching programs. In a scientific mode, Gould SEL maintained that its 32/8780 offers throughput equal to an IBM 3033U mainframe — about five to eight times faster than other 32-bit superminis on the market.

The 32/8780 is available with 256K to 16M bytes of main memory. Users can select either 32K or 64K bytes of cache memory and there are six I/O ports available to the user, Gould SEL said.

The 32/8750 is available in basically the same configuration as the high-end model. Users can select 256K to 16M bytes of main memory, either 32K or 64K bytes of cache memory and can access up to six I/O ports. Both processors are based around Gould SEL's high-speed synchronous bus, Selbus, which features a transfer rate of 26.67M byte/sec, the vendor said.

Main Difference

The main difference between the two units is the type of central processor used, according to a vendor spokesman.

The 32/8780 employs a central processing unit to handle I/O, interrupt and computational duties and offers an internal processing unit dedicated to computational tasks, the vendor said.

Both 32/8780 processors are based on emitter-coupled logic (ECL) semiconductor technology and have processor cycle times of 75 nsec. There are two ECL-based floating-point processors incorporated into the two central processing units, according to Gould SEL.

The 32/8750 has a single central processor and does not offer the internal processing unit. Since it only uses one central processor, it is not capable of multiprocessing; however, the unit can be field-upgraded to the larger 32/8780 model, the vendor said.

Both the 32/8750 and the 32/8780 use Gould SEL's MPX-32 operating system and are compatible with other processors in the 32/87 line. A basic 32/8780 system with 32K bytes of cache memory on each processor, 2M bytes of main memory, two built-in floating-point processors, an I/O processor, a diagnostic processor, line printer and floppy disk controller, a dual floppy disk drive and a console cost $330,000. A similarly configured 32/8750 costs $235,000.

The 32/8750-to-32/8780 field upgrade costs $100,000. The 32K-byte cache memory upgrade kit costs $30,000 and can be used on either the 32/8750 or 32/8780, the vendor said. Gould SEL, which previously did business as Scientific Engineering Laboratories, Inc., can be reached at 6901 W. Sunrise Blvd., P.O. Box 9148, Fort Lauderdale, Fla. 33310-9148.

Service Tracks Trends in DP

LA JOLLA, Calif. — Computer Intelligence (CI) Corp. has announced System Trend Service, a series of graphics and tabular analyses of major computer systems in the U.S. Presented in hard-cover manual format, the serivce is offered on a subscription basis and allows users to track changes in the computer market, product migration and purchasing trends, a spokesman said.

Each issue is dedicated to specific systems; these include IBM 370 architecture plus compatible systems, 4300 series, Series 30, Hewlett-Packard Co. HP 3000, Digital Equipment Corp. VAX and Prime Computer, Inc. and Wang Laboratories, Inc. equipment. Data is updated yearly.

The information provided by the service is based on the CI Computer Installation Data File, telephone interview programs and staff estimates. Extensive use of color graphics that are supported by tabular data enable the user to perform additional analysis and groupings.

Subscription for the service is $350/mo with an initial fee of $1,000.Computer Intelligence Corp. is located at Suite 210, 3344 N. Torrey Pines Court, La Jolla, Calif. 92037.

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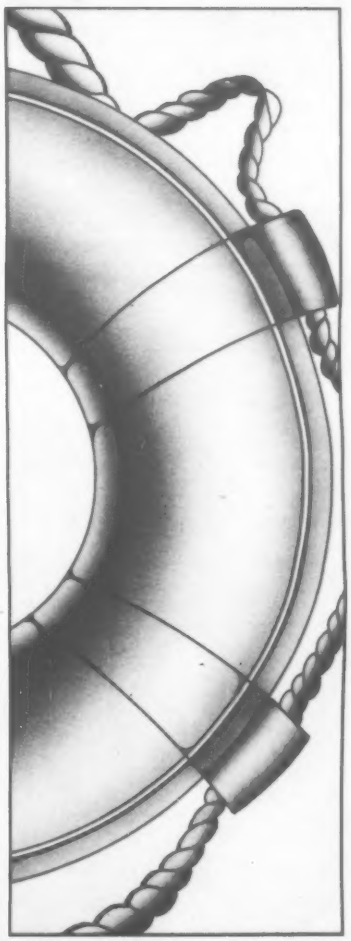

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Key Congressmen Agree on Amendments to H.R. 5158

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Two key members of the House of Representatives Commerce Committee last week announced agreement on amendments to H.R. 5158, the pending Telecommunications Act of 1982.

Their announcement was made at a packed press conference where representatives of several state public utilities commissions praised Rep. Tim Wirth (D-Colo.) and Rep. John Dingell (D-Mich.) for resolving issues that had threatened to torpedo rewrites of the 1934 Communications Act.

Since Dingell is chairman of the House Commerce Committee and Wirth leads its Telecommunications Subcommittee — the group that drafted H.R. 5158 — their endorsements of the amendments improves the bill's chances of winning the committee's approval, sources noted.

That event, according to a committee staffer, could occur as early as this week.

The main amendment to H.R. 5158 consists of two parts. The first part would allow Bell operating companies to market new terminal equipment as soon as the operating companies can establish a separate subsidiary.

The second part would allow the Bell operating companies to request permission from the Federal Communications Commission to offer enhanced services before they went to court and sought a waiver of the consent decree proposed last January as the culmination of the U.S. vs. AT&T antitrust suit.

That would make it easier for the Bell operating companies to lift the local-exchange service limitation in the decree.

H.R. 5158, as presently drafted, does not address the Bell operating companies enhanced services question.

The other two changes to which Wirth and Dingell agreed involve access charges and "lifeline" telephone service. The former provision would give state public utilities commissions more control over access charge tariffs and an "interexchange joint board" more leeway in determining what costs should be included in those charges.

Under the latter provision, carriers would have to continue providing minimal telephone service at a regulated rate after 1990, when all other terminal equipment would be deregulated.

American Bell AT&T's Baby; Net 1 Debuts

(Continued from Page 1)

mission and communications network management among usually incompatible DP devices. The company noted that 84% of existing terminals will be able to communicate via Net 1.

The system's customers will connect their terminals to Net 1 through a common carrier that provides an access line to one of 17 "service points" nationwide, according to the company. At these points, the communications protocols used by terminals and computers are translated through "nodes" and access to processing and storage will be provided.

A common-carrier packet network will then be used to transport data among service points, American Bell said.

Net 1 can provide compatibility among data communications devices over a broad range of transmission speeds, codes and line controls in point-to-point and multipoint communications on both private and public transmission lines, the company noted. "The compatibility of a wide range of devices makes it feasible to develop a new intercompany data communications application without having to replace existing terminals, procedures and data formats," American Bell stated.

The system will also provide network management functions such as network trouble detection, isolation and recovery. It can manage network facility substitution in the event of a failure and alternate routing to overcome channel problems, according to a company spokesman.

Net 1 operates under the VMS operating system on Digital Equipment Corp. VAX-11 superminicomputers and offers a version of Ansi Cobol as its programming language. Although American Bell will provide some software for Net 1, the company said it will encourage other software producers to create data bases and applications for the system.

American Bell has scheduled Net 1 availability for the third quarter of 1983 and said that the system's pricing structure will be based on usage. Users will pay only for what they use based on a basic rate, actual usage of processing time and storage facilities and customer-designated priority of the transmission, the spokesman explained.

Headquarters for the new company will be in Parsippany, N.J., with other major locations in Somerset and Lincroft, N.J. Sales offices will be located nationwide. American Bell said its initial staff will number nearly 1,000.

Access Links Incompatibles

(Continued from Page 1)

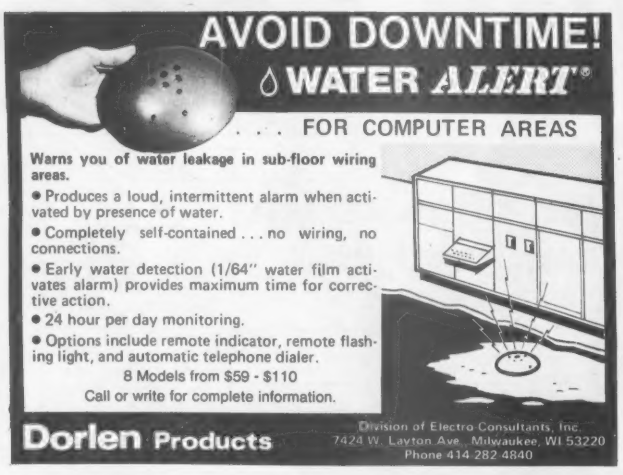
munications systems through one of its two Infomaster computer/communications complexes, its Western Union Electronic Mail, Inc. (Wuemi) computer facilities and Western Union satellites, a spokesman claimed. Infomaster handles telex messages, telegrams, cablegrams and mailgrams. Wuemi processes the U.S. Postal Service's Electronic Computer-Originated Mail service and Western Union's Computer Letter service.

The company noted, however, that user terminals must meet certain criteria to be compatible with the Access system:

- The terminal must be capable of storing off-line data either internally or externally.
- It must transmit in an asynchronous mode.
- It must transmit in Ascii at 110, 300 or 1,200 bit/sec.
- Its modems or acoustic couplers must be compatible with either Bell 103/113 or 212A models or Racal Vadic, Inc. 3400 models.

Pricing for the service includes a monthly subscription fee of $10 for the initial input device and $5 for each additional device. The system is available immediately.

More information is available from Western Union Electronic Mail, a subsidiary of Western Union, at 1651 Old Meadow Road, McLean, Va. 22102.



Managers on the Move

RICHARD E. KIRBY has been appointed manager of information services at CF&I Steel Corp. in Pueblo, Colo. He will be responsible for all computerized activities, including information systems and process control applications with the mill operations.

Kirby joined CF&I Steel as a programmer/analyst and was promoted to project leader.

He later served as senior systems analyst and supervisor and manager of systems and programming.

•••

BOB D. MCINTIRE has been promoted to vice-president of data systems at Lee Way Motor Freight, Inc., headquartered in Oklahoma City. He will be responsible for the administration and supervision of the company's nationwide computer network.

He has been with the company for 25 years and was formerly director of data systems for the company.

•••

DENNIS D. BOCK has been appointed manager of information technology for Armco's Information Resources Management Division, based in Middletown, Ohio.

Prior to his recent promotion, Bock was supervisor of office systems and manager of administrative productivity systems for the division. Before that, he was supervisor of management support systems.

He holds a B.B.A. degree in accounting and economics from Wisconsin State University in Whitewater.

•••

ANTHONY L. QUINTILIAN has been named manager of computer services for Armco's Information Resources Management Division in Middletown, Ohio.

Before his recent appointment, he was assistant vice-president of information services at Armco Insurance Group, Inc. and later became manager of computer services for the Information Resources Management Division.

He graduated with a B.S. degree in education from the University of Maryland.

Correction

Human Computing Resources Corp.'s HCR/Edit, HCR/Pascal and Multiplan software [CW, May 24] costs $750, $1,000 and $750, respectively. The vendor is located at 10 St. Mary St., Toronto, Ont., Canada M4Y 1P9.

Blacks Claim Discrimination

Racism Charges Surface After IBM Shootings

By Susan Blakeney
CW Staff

WASHINGTON, D.C. — The May 28 shooting spree at an IBM office building that left three people dead may have opened a proverbial can of worms here.

Edward Thomas Mann, a black 38-year-old former IBM employee, appears to have been motivated by long-held feelings that he was discriminated against by IBM, contending that he was repeatedly passed over for promotion in favor of whites, according to reports in *The Washington Post* and *The New York Times*.

After the episode, Mann was quoted in the *Times* as saying IBM "is very prejudiced, [but] they disguise it in a very businesslike way," [CW, June 7].

Later, Mann was quoted by the *Post* as saying IBM "has continually maintained a practice of disparate treatment toward black employees."

IBM Blamed

Furthermore, after initial charges were brought against Mann in Montgomery County, Md., another black former IBM employee, Edell Lydia Jr., told *Post* reporters that IBM was "responsible for all the deaths and injuries" that occurred during the shooting and also that IBM had "insidious, vile, racist policies" toward black workers.

Lydia reportedly won a five-figure 1975 discrimination suit against IBM.

Yvette Lowman, an IBM senior associate programmer and recording secretary for the National Black Workers Alliance of IBM Employees (BWA), gave *Computerworld* this statement: "The National Black Workers Alliance of IBM Employees wishes to express its deepest sympathy and regrets to the victims and their families for the senseless shooting that occurred at the IBM facility on Fernwood Road on Friday, May 28.

"We do not condone the actions of Edward Thomas Mann and we feel strongly that this is not the way to express grievances and/or feelings of unjust treatment.

"The environment that leads an Edward Thomas Mann to express his frustrations in this violent way still exists within IBM. We implore the IBM corporation to investigate the conditions that black employees have been subjected to, and are still being subjected to, that lead to this tragic incident."

Larry Barton, president of the New York chapter of the BWA, said this of racial prejudice at IBM: "There's a lot of frustration in the company. There is a large number of class action suits pending against IBM ... they just drag on and on, disappearing into the woodwork. They can't seem to resolve the problem."

Barton suggested the Mann incident was "one of the outcroppings of an extreme case."

Richard Hudson, a black former IBM employee of 17 years, remarked that "What happened to Mann was typical of what happens to blacks at IBM ... the slots above are reserved for whites — we just can't go any further."

Responding to allegations that its corporate policies are racist, IBM spokesman Dan Udell said: "Edell Lydia Jr.'s charges that IBM is in some way responsible for the deaths and injuries in the May 28 violent episode at our office is an irresponsible attempt to capitalize on a human tragedy."

Udell went on to say that "IBM is proud of its equal opportunity record," and "we believe there isn't a major company in the country that has a better one."

As for what may happen at the Mann trial, Udell said, "It's much too premature for any comment."

Defense attorney Kenneth Mundy stated that Mann would probably plead not guilty at his preliminary hearing, slated to take place this week in Montgomery County. Mundy also claimed that since accepting the case, his office has received at least a half-dozen unsolicited phone calls from blacks attesting to IBM's discriminatory proclivities.

Mann is presently being held without bail at the Montgomery County Detention Center on three counts of murder and 11 counts of assault with intent to murder.

On-Line Job Service Introduced by Dialog

PALO ALTO, Calif. — Dialog Information Services, Inc. has announced the on-line availability of Career Placement Registry/Experienced Personnel (CPR/EP), a service produced by Career Placement Registry, Inc.

CPR/EP enables job-hunters to make their credentials available to prospective employers for between $15 and $40 per hour, depending on salary requirements. Employers can access the data base for $5/resume or $50/hour.

Further details can be obtained from Dialog at 3460 Hillview Ave., Palo Alto, Calif. 94304.

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Corporate, Operations Caps

Pitney Bowes VP Has Two Hats to Match Tasks

By Susan Blakeney
CW Staff

STAMFORD, Conn. — Joseph Nash is a man who doesn't seem to mind wearing two hats at all.

The newly appointed vice-president of management information services (MIS) at Pitney Bowes, Inc. has a "corporate hat" and an "operations hat." When he is wearing the former, he is working on the long-term strategic policy of MIS activities throughout Pitney Bowes. When he dons the latter he is in charge of the Pitney Bowes data center for U.S. Business Operations, which consists of twin Sperry Univac 1182 mainframes and approximately 280 DP people.

As the operational vice-president of MIS, Nash oversees all equipment and software acquisition, DP reviews and five-year plans. Software used at Pitney Bowes is a mixture of home-grown and packaged programs, he noted.

So far, Nash is very enthusiastic about his roles at the company, because they allow him to work on both the business level and the DP level.

Photo by J. Dugan

Joseph Nash

"What turns me on is being part of the total business process ... and providing a high level of service in a cost-effective manner — which means we have to stay in touch with technology and trends," Nash remarked in a recent interview.

Nash maintained that his biggest challenge at Pitney Bowes has been to convince management that MIS should be an integral part of present and future business plans. He argued that MIS can provide real productivity gains that have yet to be realized.

Nash is also in charge of office automation at the company and is presently trying to formulate internal strategic plans for automating Pitney Bowes' multiple facilities. Again, he wants to interface with corporate strategic policy making, so the office automation schema jives with the overall Pitney Bowes strategy as well as his MIS policies. Nash feels that streamlining and consistency in policy making makes good business sense.

He firmly believes that "a good MIS manager should be a businessman first — and be able to fit MIS technology to serve the business' needs."

True to his own beliefs, Nash was a businessman first. After earning a B.S. degree in business administration at Syracuse University, he received an MBA from Pace University. He then gained his technical expertise in a series of positions with GTE Corp., Electronic Data Processing Resources and IBM.

The vice-president joined Pitney Bowes in 1981 as director of corporate MIS. About his work at the company so far, he said it has been a "very active and challenging" experience.

According to Nash, a good manager also "has got to be able to work effectively with people." When asked about staff turnover, Nash commented that Pitney Bowes is probably typical of any other MIS shop in terms of turnover problems. In order to counteract a high turnover rate, he tries to "provide an environment where people can pursue an active career in MIS and provide people with tools that are up with technology — such as [data base management systems]."

Terminals, Software Lead NCGA Product Parade

(Continued from Page 1)

edly allows nontechnical office workers to produce simple, original charts in a few minutes.

• Draw, a module that uses various geometric shapes, symbols and figures to create visual aids like organization charts, flow diagrams and line drawings.

• An enhanced version of HP's existing Decision Support Graphics (DSG)/3000 program.

All three components of the HP business graphics package operate with the firm's Text and Document Processor/3000 software, which allows words, data and graphics to be merged within a single document. The trio also operates with HP's 2680A laser printer, which can output the resulting hard copy at 45 page/min.

By allowing all document preparation steps to be performed electronically, the graphics software package bypasses manual typesetting, cutting and pasteup and thus decreases both the time and expense involved in producing reports and manuals, an HP spokesman said.

Together, Easychart, Draw and the revised DSG/3000 cost $10,750. Bought separately, the modules sell for $3,000, $4,000 and $6,300, respectively. The firm is located at 1501 Page Mill Road, Palo Alto, Calif. 94304.

Another company that formally expanded its line of graphics-oriented offerings here was California Computer Products, Inc. (Calcomp), which used the NCGA show to launch an enhanced CPU for its IGS 500 computer-aided design (CAD) system. Calcomp also announced a color graphics workstation that operates both with the multiuser IGS 500 and the single-user IGS 400.

The enhanced Model 16/65 CPU allows the IGS 500 system to support up to six concurrent users, compared to a maximum of four for the CAD product's existing 16/40 processor. In a four-terminal configuration, the 16-bit 16/65 provides 50% to 100% better response time than its predecessor, Calcomp said.

Complementing the 16/65 is the Calcomp color graphics workstation, which boasts an 832 by 624 pixel resolution and is reportedly both hardware- and software-compatible with its black-and-white counterparts. From a 4,096-color palette, the unit can select and simultaneously display up to 16 hues on its 19-in. diagonal screen, Calcomp said.

Available for shipment in September, the workstation costs $78,000, compared to $15,000 for the 16/65, the firm said from 2411 W. La Palma Ave., Anaheim, Calif. 92801.

Like Calcomp, Ramtek Corp. also came to the NCGA show to introduce a color graphics terminal formally. Ramtek credits its Model 6412 with offering a 1,280 by 1,024 pixel resolution and eight times the refresh memory of the firm's Model 6211.

In a standard configuration, the 6412 provides four refresh memory planes, which allow the product to select from a 16-million-color palette and display up to 16 colors simultaneously. An optional configuration incorporating eight refresh planes increases the terminal's display capabilities to 256 simultaneous colors, Ramtek said.

A rack-mounted 6412 with four refresh planes costs $19,600, with an additional four planes available for $3,500. The firm is located at 2211 Lawson Lane, Santa Clara, Calif. 95050.

Some other graphics-oriented products that made their debut at the NCGA show include:

• Infographics, Inc.'s first commercially available system, which uses a decision tree that helps users to decide how best to design and color their graphs. With a laser printer, Digital Equipment Corp.'s 256K-byte LSI-11 and color display unit, the system costs $80,000. The firm is located at Suite E, 201 Shipyard Way, Newport Beach, Calif. 92663.

• Spectragraphics Corp.'s System 1250, a raster-display system that emulates the IBM 3250 and starts at less than $50,000. The system is available in either local or remote configurations and supports up to four workstations per controller. The firm is located at 3333 Camino Del Rio, San Diego, Calif. 92108.

Other terminals introduced included Raster Technologies, Inc.'s Model One/40 and Genisco Computers, Inc.'s G-6100.

The Model One/40 reportedly allows applications written on either it or Raster's existing Model One/20 terminal to be displayed on a 1,024 by 1,024 line monitor. Previously, applications developed on the Model One/20 could be projected only on a 512 by 512 line monitor.

Depending on configuration, the Model One/40 costs $11,000 to $19,000, with shipments slated to start in August. The firm is located at 9 Executive Park Drive, North Billerica, Mass. 08162.

Like the latest Raster product, the Genisco G-6100 is intended primarily for applications like CAD and simulation. The interactive terminal's 16-bit CPU, bit-slice arithmetic logic unit and 160-nsec instruction execution capability allow the system to relieve host processors of complex display operations, a Genisco spokesman said.

Prices for the G-6100 range from $25,000 to $30,000 and depend on the terminal's resolution, which can be specified at either 768 by 512 pixels or 1,392 by 1,024 pixels. Genisco is located at 17805 Sky Park Drive, Irvine, Calif. 92714.

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Futurist Cites 'Immaturity' of Graphics Industry

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — Computer graphics still has a long way to go before it matures as a business, and it is fraught with potential pitfalls for uninitiated users.

In its development, graphics trails the industry's mainframe sector by about 15 years, according to Dick Bertrand, a technology "futurist" with Standard Oil Co. of Indiana. The symptoms of the graphics field's widespread "immaturity" are myriad, Bertrand said last week at a conference and exhibition sponsored by the National Computer Graphics Association (NCGA).

False advertising, an absence of standards, inadequate support and a low degree of systems integration still plague the graphics business in spades, Bertrand said.

For users, the field's failure thus far to come of age can make the installation and management of a computer graphics system a highly risky proposition indeed, he observed. Bertrand referred to the potential pitfalls as "black holes" that coincide with almost every major phase of a graphics system's life cycle and can be traced to a variety of causes, including the failure to:

- Anticipate turnaround needs and hidden user demand.
- Make allowances for product incompatibilities.
- Obtain a sufficient number of trained operators.
- Ensure an adequate level of vendor support.
- Focus systems attention on the right business problem.

Another black hole can arise when a would-be graphics system buyer begins to peruse vendor sales literature and advertisements, which are "full of lies" and littered with nonstandard, "meaningless terminology," Bertrand said.

To illustrate his point, the oil company representative pointed to the product exhibitors on the nearby NCGA show floor. "I challenge you to go out to the exhibit area here and try to find a graphics company that doesn't describe its terminals as 'high-resolution,' " Bertrand told his listeners.

CW At NCGA

To sidestep the potential pitfalls involved in installing and operating a computer graphics system, users should regard vendor performance claims with a measure of healthy skepticism, he advised. "Be leery and careful," Bertrand said. "If some company tells you its system can walk on water, bring in a bucket, throw the product in and watch what happens."

Bertrand also urged prospective graphics systems customers to involve a broad spectrum of their users in any product selection and to insist on an in-house demonstration before committing to a particular unit.

In addition, he advised users to lease or rent their graphics systems rather than buy, to obtain a vendor's written guarantee that it will provide operator training and to avoid unnecessary penny pinching.

Bertrand, who works in his company's computing and information technology section, spoke during a June 16 NCGA conference session dealing with "Implementation Issues in Business Graphics."

Capacity Journal Slated for August

SUNNYVALE, Calif. — *The Journal of Capacity Management* is the title of a new quarterly publication created by The Institute for Software Engineering, the research arm of Boole & Babbage, Inc.

Scheduled for release in August, the journal will aim at international, academic and business communities facing increasing management and technical pressures as data processing assumes a larger and larger role in business and institutions.

Subscription rates for the journal are $95/year; for educational institutions, the cost is $25/year. Members of the institute will receive the journal free as part of their membership benefits. Further details are available from the institute at 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Bell Labs Expands Unix Intro Seminars

TORONTO — Human Computing Resources Corp. (HCR) has expanded its program of two-day introductory seminars on Bell Laboratories' Unix system in major North American cities. The seminars are now being conducted in San Francisco, Boston, Washington, D.C., and Toronto.

According to HCR, these seminars are directed at software managers, consultants, analysts and programmers interested in learning the basics of Unix. The program provides an overview of the technology, which is now becoming available on a large number of hardware configurations, the vendor said.

The course costs $425, HCR said from 10 Saint Mary St., Toronto, Canada N4Y 1P9.

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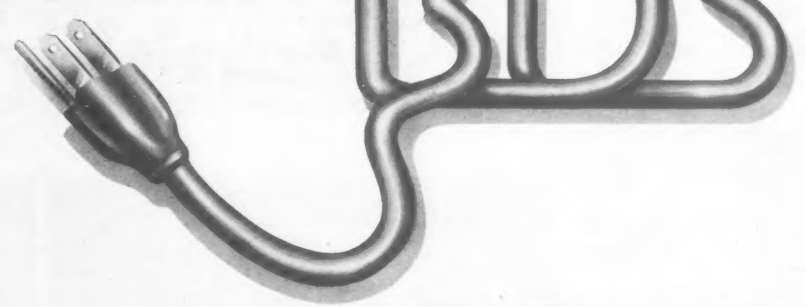

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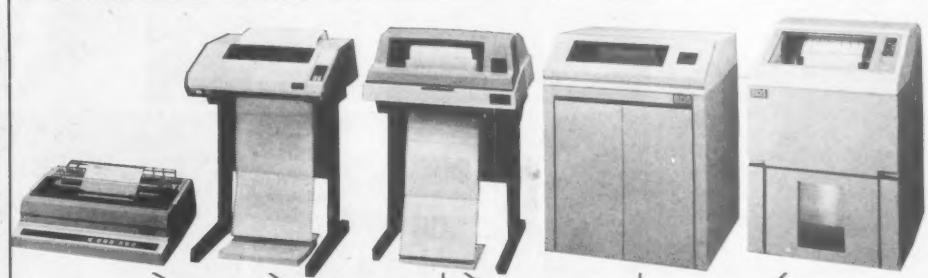

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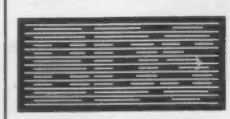

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Graphics Not A 'Throw-Away,' Director Says

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — Many end users in the business world still mistakenly regard computer graphics as a "toy" or a "throw-away technology."

That view was expressed here last week by Alan Paller, training director for the three-year-old National Computer Graphics Association (NCGA).

CW At NCGA

Speaking last week at the NCGA's third annual conference and exhibition, Paller likened the current status of graphics systems to the infancy of another widely used business technology — air conditioning.

Back during the '30s, most corporate executives viewed air conditioning as a luxury that served no important business function.

"Managers felt that the human race had survived without air conditioning for thousands of years and that their employees weren't the sort of people who needed to be cool all the time," Paller said.

But just a few years later, attitudes abruptly changed when a "highly reputable" research organization published the results of a study that showed air conditioning significantly boosts a factory worker's productivity, Paller said.

That research finding gave corporate executives just the hard, bottom-line evidence they needed to justify a full-scale conversion to air-conditioned production facilities. The changeover received further impetus during the early '40s with the outbreak of World War II.

Today, computer graphics technology finds itself at much the same critical juncture where air conditioning stood about 40 years ago. Many business executives know deep in their hearts that graphics qualifies as a powerful management tool, but they are reluctant to commit themselves to the emerging technology until its bottom-line benefits have been indisputably proven, according to Paller.

Such justification is now at hand, he added, in the form of a recently completed research study by the University of Pennsylvania's Wharton School of Business.

The Wharton investigators, who released their findings within the last few months, sought to find out whether charts or other visuals truly enhance oral and written presentations.

They concluded that graphics, either hand-drawn or computer-generated, allow corporate executives to trim the length of their business meetings by an average of 28%.

Another significant finding from the Wharton study is that business managers can absorb material and make decisions 11% faster with graphics-supported presentations than with speech or text alone, Paller said.

Foreign Graphics Products Debut in U.S.

ANAHEIM, Calif. — Last week's National Computer Graphics Association (NCGA) conference also marked the debut of several graphics-oriented products that have never before been available in the U.S., but have already been used extensively in other countries.

Examples of such offerings included the latest additions to the D-Scan series of intelligent graphics terminals from Seiko Instruments U.S.A., Inc.

Another example is a complete graphics system from the Ottawa-based vendor Orcatech, Inc.

Seiko's latest D-Scan family members include the GR-2412, a seven-color terminal, and the GR-2212, a monochrome counterpart.

Although both units qualify as raster-scan products, they boast an "antialiasing" feature implemented directly in hardware rather than in firmware or software, Seiko said.

This capability eliminates the ragged edges so often associated with raster-generated graphics and allows the latest D-Scan units to produce images that rival the aesthetic appeal of vector-displayed output, the company said. Both terminals reportedly offer a 1,024- by 780-pixel resolution and are built around a 16-bit Zilog, Inc. Z8002, with a Zilog Z80A dedicated to I/O processing.

The GR-2412 and GR-2212 terminals will become available for shipment during the third quarter of this year. The two terminals will cost $21,850 and $17,850, respectively, according to the firm. Seiko is located at Suite 140, 2620 Augustine Drive, Santa Clara, Calif. 95051.

Meanwhile, the Orcatech system is intended primarily for computer-aided design applications and incorporates dual processors, one dedicated to graphics functions and the other to the execution of system and user software, Orcatech said.

Equipped with a 1,024- by 1,024-pixel resolution, the system ranges in price from $22,000 to $50,000, Orcatech said from 2680 Queenview Drive, Ottawa, Ont., Canada K2B 846.

What if you could Zenith quality for

Graphics From All Angles

End Users Targeted At Five-Day Conference

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — End users were clearly the main targets of last week's third annual National Computer Graphics Association (NCGA) conference and exposition.

NCGA '82 preserved the original focus of the event's two previous incarnations, both of which were geared primarily for buyers, not for sellers, of graphics-oriented products.

Nowhere was the show's accent on users more clearly illustrated than in its five-day conference program, which explored the fast-growing graphics sector from nearly every conceivable angle. Topics of seminar discussion ranged from business charts to computer-aided design, from animation to video disk technology and from statistical drawings to graphics applications in the military.

CW At NCGA

By the time the NCGA conference program finally ended its run on June 17, the menu of graphics-related tutorials and technical sessions had swollen to nearly 90 items.

Complementing the lineup of user-oriented briefing sessions was an NCGA-sponsored product exhibit, which covered about 130,000 square feet of Anaheim Convention Center floor space. Many of the trade show's more than 160 exhibitors used NCGA '82 as an occasion to introduce their latest offerings formally, which included terminals, software packages and complete computer graphics systems.

The conference's unmistakable end-user flavor distinguished it from many other graphics-related gatherings, which tend to be tailored largely for vendors rather than their customers, according to NCGA training director Alan Paller.

Even before it officially opened its doors on June 13, the conference and product exhibition had already surpassed its two predecessors in registrations.

In 1980, the year of its birth, the show took place in Washington, D.C., where it drew about 1,700 visitors, more than twice the original estimate. Last year, in Baltimore, attendance grew to 9,000, and this year, the head count exceeded 30,000. On June 1, advance registrations already totaled more than 10,000, conference organizers said.

In addition to sponsoring an annual convention, the NCGA conducts computer-graphics seminars and publishes several periodicals, including a bimonthly newsletter.

Founded during the fall of 1979, the nonprofit organization recently relocated its headquarters to Fairfax, Va., and currently boasts about 4,500 members.

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DEC Engineering VP Wins Eckert-Mauchly For PDP Development

NEW YORK — C. Gordon Bell, vice-president of engineering at Digital Equipment Corp., recently won the 1982 Eckert-Mauchly Award for his contributions to designing computer systems.

Bell was cited specifically for his contributions in the development of PDP-5 and PDP-8 minicomputers, the architecture and implementation of the first commercial interactive time-sharing computer, his pioneering work in hardware descriptive languages, coauthoring reference books on computer architecture and engineering and founding the Digital Computer Museum.

Bell holds bachelor's and master's degrees in electrical engineering from MIT and worked for a number of firms before joining DEC.

The award was named in honor of J. Presper Eckert and John Mauchly, co-inventors of the first electronic computer. It is given annually by the Association for Computing Machinery and the Computer Society of the Institute of Electrical and Electronics Engineers. The award, including a certificate and a $1,000 cash prize, was made at the Ninth Annual Symposium on Computer Architecture held in Austin, Texas, recently.

Award for Publication On On-Line Industry

ATLANTA — The first annual award for excellence in published papers on the on-line industry will be presented by Data Courier, Inc. during Online '82, slated to take place here Nov. 1-3.

A $1,000 cash prize and plaque will be presented to the winner. Entries will be drawn from the publications *Online* and *Database*, published by Online, Inc. in Weston, Conn.

Further details on the contest can be obtained from Data Courier at 620 S. Fifth St., Louisville, Ky. 40202.

Consuming Lion's Share of Resources

Duo Warns of Dangers in End-User Computing

By Brad Schultz
CW New York Bureau

CAMBRIDGE, Mass. — In many companies, end-user computing is rapidly consuming a lion's share of total systems resources and may lead management to relive their worst experiences with conventional DP since businesses began computerizing more than 30 years ago.

So warned two management scientists here last week at the annual seminar in which the MIT Sloan School of Management's Center for Information Systems Research (CISR) reports what their staff has learned about computing's effects on companies.

Dr. John F. Rockart, CISR's director, and Lauren S. Flannery of CISR's research staff drew their conclusions from a study of end-user computing begun early in 1980.

In contrast to conventional DP, which preoccupies DP specialists, end-user computing encompasses direct utilization of time-sharing and on-line information services by non-specialists.

End-of-Decade Prediction

Rockart and Flannery noted a prediction by a Xerox Corp. executive early last year that by the end of the 1980s end users would account for 75% of computer utilization at Xerox — in terms of millions of instructions per second (Mips), executed on major systems.

Rockart attributed to end users half the Mips presently run at a number of companies. He also said end-user computing was growing at a 50% to 100% annual rate (in terms of Mips) at many U.S. firms.

The core of the presentation Rockart and Flannery gave to an audience of about 200 DP professionals — mostly information systems executives from major corporations — was an assertion that end-user computing seems to be evolving in a fashion analogous to the evolution of conventional DP.

The most famous model of how DP evolves in companies — the stage theory advanced by Richard Nolan and Charles Gibson in 1974 — seems applicable to the evolution of end-user computing, Rockart and Flannery asserted. Early versions of the Nolan-Gibson model postulated four stages in a company's experience with computers:

- **Initiation.** The honeymoon stage in which the computer debuts and normally does well.
- **Contagion.** The stage when computer applications proliferate rapidly, prompting various organizational departments to compete fiercely for limited systems resources.
- **Control.** The stage when higher management cracks down on unbridled systems usage, dampening the rate of growth in systems expenditures and holding DPers more accountable to end users.
- **Integration.** The stage when a new management structure coordinates systems usage, optimizing benefits to the organization as a whole while allowing the growth rate of systems expenditures to nudge upward once again.

Since he left the Harvard Business School faculty to co-found a consulting company, Nolan has added two stages to this model, Rockart noted.

Rockart and Flannery pointed out, for example, that Harvard's Prof. Warren McFarlan and MIT Sloan's Prof. Peter G.W. Keen have independently called the organizational behavior described by the Nolan-Gibson model a special instance of "the learning curve" — the notion that people or organizations may choke if they ingest technology too rapidly.

In a paper distributed at last week's seminar, Rockart and Flannery said the Nolan-Gibson model was applied to "the Cobol shop." But, if it were applied to end-user computing — for instance, "the APL, Ramis, Express, Basic shop" — then "most companies today are in the [Initiation] stage." However, "a very clear set of companies" have moved into the [Contagion] stage of end-user computing.

CISR Working Paper 76 by Rockart and Flannery may be ordered for $4 from CISR, MIT Sloan School of Management, 77 Massachusetts Ave., Cambridge, Mass. 02139.

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Handouts Available From EDP Meet

PHOENIX — Applied Computer Research, Inc. has made available to its subscribers the handout material from its third annual Conference on on EDP Performance Management held recently.

The handouts are contained in a three-ring loose-leaf binder and include a combination of presentation materials and papers.

Among the topics included in the handouts are: "the user service agreement," "translating business plans into computer capacity," "key factors for motivating DP personnel" and "automating the plant."

The material is available for $25 from Applied Computer Research, P.O. Box 9280, Phoenix, Ariz. 85068.

DP Stages Seen Suggesting Cycle For End Users

By Brad Schultz
CW New York Bureau

CAMBRIDGE, Mass. — The stages in the Nolan-Gibson theory of DP evolution suggest an "inescapable" cycle for end-user computing that may have "debilitating, and often devastating," effects on information systems management during the third stage, attendees at last week's Center for Information Systems Research (CISR) seminar were warned.

"In too many companies," CISR's Dr. John F. Rockart and Lauren S. Flannery observed, "the Cobol shop went through a stultifying crunch of human and financial resources as it entered the [Control stage].

"Observing things to be 'out of control,' top managers of these companies demanded immediate pruning of many projects and a closely cost-justified approach to those remaining," they wrote in a paper distributed at the seminar. "In many cases, much worthwhile work was terminated. Some companies fell far behind in their use of the computer as draconian control measures were put into place."

Rockart and Flannery declared that this "dark age" could be imposed again as end-user computing comes to dominate an organization's overall systems usage. But with most companies still in the first two stages, information systems management has an opportunity to foresee the problems that might invoke such a period of havoc, the management scientists advised.

In their paper, Rockart and Flannery described what they learned from studying end-user computing at "a multibillion dollar company that develops, manufactures and markets a wide range of information processing products." The paper called this company "Apex," disguising its real name.

The paper stated that during the past five years, the Apex DP budget has increased by only 10% annually; but end-user utilization of internal time-sharing services has jumped by almost 25% annually and presently accounts for about a quarter of total DP expenditures.

Five Reasons

From intensive interviewing of end users, Rockart and Flannery deduced five reasons why end-user time-sharing had increased so dramatically:

- Availability of APL allowed fast development time since end users could solve their own problems with this high-level language.
- APL allowed applications to be prototyped.
- Although widely dispersed geographically, Apex end users found time-sharing services easy to access and were able to have jobs executed quickly at their convenience.
- End users generally viewed the company's various information systems departments as unresponsive to their needs.
- End users were free to hire programming help from outside Apex or to train employees within their departments for roles in applications development and maintenance.

Perry Receives WIP's First Hopper Award

By Marcia Blumenthal
CW Staff

HOUSTON — Women in Information Processing (WIP) awarded its first annual Captain Grace Murray Hopper award to Janet Perry at a special meeting of the group here during the recent National Computer Conference. Perry, a systems analyst for United Vintners, Inc. in San Francisco, is president of WIP's Western Regional Forum.

A relative newcomer to information processing, Perry's interest in the profession was sparked when she was on a temporary clerical assignment at Westinghouse Corp., working for a group preparing documents for an antitrust case. "I was one of those poor souls who read legal contracts and entered them into the computer," she said after the award ceremony.

When Perry became fascinated with what her boss was doing — designing the data base and user interface for the project — he suggested she enroll in an information science program at the University of Pittsburgh, an offshoot of the library science department. The program taught information systems based on a "librarian philosophy" that focused on users.

After finishing the one-year program, Perry joined Pacific Gas and Electric Co. One of her major projects was developing a forecast system for the gas department. She began her current job, where she is developing standards and training for a United Vintners data dictionary project, about two months ago.

Perry's enthusiasm for her career has spilled over into organizing WIP's Western Forum. Since its first meeting in January 1981, Perry has interested 300 women in becoming members of WIP.

Her commitment to the networking organization in information processing grew out of the realization that "I didn't know many people outside of my husband's sphere, which is academics."

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Documentation Writers Seen Facing Dilemma

By Bob Johnson
CW New York Bureau

HOUSTON — DPers who write software documentation face a dilemma: They have to write for novice DPers and at the same time must not insult the professionals.

So said Rita Gail MacAuslan, leader of a session on "Effective Software Documentation" at the recent National Computer Conference here.

MacAuslan explained that as the user community changes within the DP industry, reflecting more clerical users and non-DP types, the job of the documentation writer becomes harder than ever.

"Computer documentation and design has to be changed and geared to new users. Not only does it have to be complete, but it has to speak to the appropriate level of competence and refer to both technology and technical capabilities," she said.

Also speaking at the session was Janis Raymond of the Michigan Wisconsin Pipeline Co. Raymond, a former documentation writer herself, pointed out some major areas that must be addressed for software documentation to be effective.

Of primary importance is user identification; to identify the user properly, the writer has to ensure that a manual satisfies his needs.

"The writer has got to step away from computer jargon so the user can fully understand what's in the manual," Raymond said.

"It may be more work to write in understandable English when you're a DPer, but it saves time in the long run," she explained.

Raymond noted that users do not want to be burdened with unnecessary DP talk and stressed that an important part of clear writing is the tone of the language and the level of DP proficiency possessed by the person to whom the writer is addressing.

Another part of identifying the user deals with the organization as a whole and what department or group of departments will ultimately use a system.

Raymond noted that this is not as simple as it sounds. She then pointed out that the writer should know the specific needs of each department so that an effective manual can be produced.

"As an example, sensitive information may be permitted in one department that has authority to see it but not allowed in another," she stated.

Another important aspect of documentation writing is determining what the user knows about DP, the speaker said.

Raymond explained that proper documentation will aid the user in his job.

"Know the user's educational level and write the manual from his perspective. If there is a problem communicating the message to a user because of language, you run the risk of alienating him," Raymond said.

There are three major points in documentation which have to be explained to the user, according to Raymond. They include what the system does, how to get data into it and what kind of information comes out of it, she said.

Raymond said that the documentation's system overview should be written from a user perspective with enough information to let him determine if it meets his needs.

Also, the overview must explain input procedures such as batch forms and on-line interaction as well as information as to what kinds of reports will come out as output and how they will be generated.

The speaker added that error messages on reports must be spelled out for the user, and documentation writers should work with both the user and programmers in the planning. "It is worthwhile to go one step beyond and make sure the user knows how to correct problems."

Forum on OA Set for Sept. 13

BOSTON — A forum for the discussion of important office automation issues will be held here Sept. 13-15 by *Computerworld OA*, *Computerworld*'s new quarterly on OA.

Three major problem areas encountered by computer professionals involved with OA will be discussed:

- Personal computers in the office — Are personal computers a realistic solution to corporate OA, word processing and decision support?
- DP's role in OA — Is the DP professional qualified as a leader and facilitator of complex OA systems?
- Advanced telecommunications applications — What do you need to begin electronic mail? What is the role of private branch exchange?

Speakers will include Amy Wohl, president of Advanced Office Concepts Corp.; Dr. Dixon Doll, president, DMW Group; Dr. John McQuillan, president of BBN Information Management; and Maggie Canon, editor-in-chief of *InfoWorld*.

The registration fee ranges from $145 to $595, depending on the number of days attended. More information is available from Louise Myerow, registration manager, or Karen Bartnicki, conference manager, at the Conference Management Group, CW Communications, Inc., P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

Alternative to High-Level Languages

Group Cites Application Generators' Potential

By Lois Paul
CW Staff

HOUSTON — "There is potential here for some revolutionary changes in the way we do our business," observed Jerrold M. Grochow, moderator for a session on "Application Generators: Current Use and Future Prospects" at the recent National Computer Conference here.

Grochow, who is vice-president of product development and research for American Management Systems, Inc., said that until two years ago, the term "application generators" was not widely used. Since then, however, he has seen 40 to 50 products that have used this description in their literature.

The first session speaker was Bill Grafton, manager of data base systems for Continental Airlines, who presented an overview of application generators that he developed with Alfonso Cardenas of the computer science department of the University of California at Los Angeles. "The time has come for an alternative to the aging high-level languages such as Cobol and Fortran," Grafton said. The problems that these traditional approaches have resulted in have been slow response to user requests for projects and a backlog of undeveloped systems.

"The culprit seems to be procedural coding techniques," he said. "A new approach is necessary to overcome the problems and break the logjam in application development and maintenance."

He identified the types of application generators as:

- Turnkey application software.
- Self-customizing.
- Generalized file management systems and report writers.
- Query language processors.
- Application development systems.
- Other generators, such as data dictionary/directory systems and precompilers.

The problems with turnkey, self-customizing and file management systems are that they generally do not use data base management systems and conversion efforts are difficult, he explained.

Although he cited the current application generation system as being fairly close to the types of products users need, he noted that their general lack of industry standards and incompatibility among new relational query systems as being potential problem areas with these software offerings.

He listed the following desired characteristics for application generation systems:

- A full system.
- Data based.
- Interface with a data base management system.
- Emphasize terminal-based applications.
- Data flow from I/O specifications.
- Nonprocedural.

Grafton cited the value of prototyping "to do quick and dirty" jobs, then fix them according to user requirements and "then . . . finalize it when it's right."

Richard L. Roth, product development manager for Information Systems Research, and Aaron M. Goodman, a marketing support consultant for IBM, discussed their firms' particular products, pointing to statistics indicating that use of application generation systems help improve programmer productivity.

James H. Waldrop, director of DP for Hamilton Brothers Oil Co. in Denver, Colo., described his firm's use of Generation Five, an application generation system from American Management Systems.

Faced with the prospect of developing a financial reporting system that included 210,000 lines of code and 53 on-line screens back in 1979, Waldrup's group selected the application generator to help them deliver the project within the tight deadline they had been given.

Waldrup concluded that the use of an application generation system did improve his programmers' productivity, was self-documenting and easy to learn. "The biggest disappointment was the design inefficiencies," he said, noting that "if we do it again we certainly will consider the technical capabilities more carefully."

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When Can We Use Ada? No Clear-Cut Answer Seen

By Lois Paul
CW Staff

HOUSTON — No clear-cut answers were provided at a recent National Computer Conference session entitled "When Will We Be Able to Use Ada?"

"With some limitations, you can start using Ada right now," Dr. Kenneth Bowles, of Telesoft, Inc. and the University of California at San Diego, said, adding that some production programs are already on the market.

Bowles explained that although Telesoft's implementation of Ada is already commercially available, some key facilities such as generics, derived types, operator overloading and representation specifications have yet to be completed.

Designed Primarily for Micros

Telesoft's compiler generates code designed primarily for microcomputers, he said, noting that it is aimed at the 16- and 32-bit processors.

"We want to have a validated compiler for people to work with," Bowles said, adding that he does not expect Ada to be used by walk-in computer store customers for some time. "We are aiming at systems developers."

Discussing "Code Generation for Generics," Dr. Ronald F. Brender of Digital Equipment Corp. explained that Ada facilities for generic subprograms and packages present definite challenges to the implementors of Ada compilers. He described a potential intermediate strategy in which generic bodies are shared by some but not all installations.

Brender contended that Ada will begin to be used when these generics become available. "It will be some time before implementations can take advantage of the full potential of the language," he said, adding that until these implementations become available, users will shy away from the language.

Ada Out in 1984?

Dr. Benjamin M. Brosgol provided a fairly direct answer to the question that the session posed — "When will we be able to use Ada?" "1984" was his response. His prediction was based on his firm, Intermetrics, Inc.'s contract with the U.S. Air Force to develop an Ada '82 compiler.

Brosgol described the Descriptive Intermediate Attributed Notation for Ada (Diana), which is an intermediate form for Ada intended to be useful both for the compiler and for other tools in the Ada program support environment.

"In the Intermetrics' design of the Ada Integrated Environment for the Air Force, the definition of Diana is accomplished using Ada itself, and the physical representation is based upon a virtual memory management strategy, which allows the tools to be written independently of host memory capacity," he explained.

Dr. Gerald Fisher of the Courant Institute of New York University (NYU), described the NYU Ada/Ed translator and interpreter, which is intended to provide an "executable" specification of Ada semantics and to provide a usable tool for language training and familiarization.

Released to the public a year ago, the Ada/Ed translator reportedly has had a good record on validation tests and is user friendly but is also very slow, with a 30 line/min translation rate. "It is usable if you can afford a DEC VAX as a personal computer," he said.

The Ada/Ed translator is available for the DEC VAX running under VMS and Bell Laboratories, Inc.'s Unix, and Amdahl Corp.'s 470 system under VTS. Fisher noted that it is mainly intended for educational purposes and to provide familiarity with the Ada language.

Dr. Larry Weissman of Softech, Inc. described the Ada Language System — a complete programming environment for the production of Ada programs — that Softech is designing and building under contract to the U.S. Army.

He said the DEC VAX version of the system is scheduled for delivery to the Army in the fall of 1982, adding that the army is expected to begin beta testing the software in January 1983. The software will be based on the 1980-1981 version of Ada, he said, noting that he expects the army will request an upgraded version for delivery by mid-1983.

IEEE Nominates Four Candidates For Exec Offices

WASHINGTON, D.C. — The Board of Directors of the Institute of Electrical and Electronics Engineers (IEEE) has chosen two candidates for each of two IEEE offices for the 1983 president-elect and executive vice-president.

For the 1983 president-elect position, the IEEE Board nominated Dr. Richard J. Gowen and Dr. Donald D. King.

Gowen is vice-president and dean of engineering for the South Dakota School of Mines and Technology. King is president of the Philips Laboratories Division of North American Philips Corp.

Executive Vice-President

For the 1983 executive vice-president position, the board nominated Charles A. Eldon and Dr. Allan C. Schell. Eldon is manager of capital equipment at Hewlett-Packard Co. Schell is director of the Electromagnetic Sciences Division, Rome Air Development Center.

IEEE bylaws provide for the possibility of petition candidates, in addition to the board nominees. Requirements for petition candidates include obtaining the signatures of at least 1% of the eligible voting membership, an IEEE spokesman said.

The two positions and various regional and technical division directors will be chosen by mail ballot this fall. More information can be obtained by contacting the IEEE, 1111 19th St. N.W., Washington, D.C. 20036.

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Consultant Says Fate Of Systems Rest With Project Manager

By Jeffry Beeler
CW West Coast Bureau

HOUSTON — Success in developing any complex business system hinges largely on an effective project manager, according to American Management Systems, Inc. consultant Naomi Bloom.

"If you don't have a competent project manager, I don't think your development effort will work out as it should, even if everything else is right," Bloom told her listeners at the recent National Computer Conference here.

The problem with qualified managers of complex business system projects is that they can often prove extremely difficult to find. In fact, Bloom said, "choosing a competent project manager can be the most difficult [system development] step of all."

Only a relative handful of individuals have notched as many as three or four solid experiences in implementing complex new business systems, she explained.

'Complex' Defined

Bloom, speaking at an NCC technical seminar, defined a complex business system as a configuration that forces a company to change itself fundamentally, either in market emphasis, organization, policy or technology. Such a system is also often characterized by the ability to create significant new business opportunities, including improved revenue streams, increased productivity, reduced overhead or enhanced decision-making power.

Expertise Needed

To manage the development of a complex business system successfully, an individual needs a "substantive, expert knowledge" of a project's bottom-line objectives, Bloom said. If, for example, a prospective system is intended to be used primarily for financial purposes, the person in charge of the product's installation ought to have a strong background in finance.

The project manager for a complex business system should also have the ability to forewarn end users about how the proposed application will affect their corporate policies, procedures and organization.

"Users don't always understand that a complex new system can alter the way they run their business," Bloom said. "If a project is likely to force a company to make a major change, this fact must be explained in advance."

Although an effective project manager need not necessarily be a computing professional by training, he or she must have enough technical competence to manage a major software development effort, Bloom said.

But at the same time, such an individual must also possess strong political and people-management skills. To the head of a complex system-development project, diplomacy and tact are important, she added.

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Plight of the Maintenance DPer Summarized

By Marcia Blumenthal
CW Staff

HOUSTON — "The absolute thing that will get you on your boss' carpet is complaints from users saying the old system doesn't work like it used to after the change."

That observation sums up the plight of the computer professional who chooses to work in maintenance, according to Nicholas Zvegintzov, an independent consultant based in Staten Island, N.Y.

Speaking at a session on software maintenance at the National Computer Conference here recently, Zvegintzov said that the bulk of what maintenance people do is try to understand what the system does. One fallacy that exists within the software community is that systems have a "life cycle," but the fact is that "systems rarely die," according to Zvegintzov.

Another major problem is that maintenance specialists and system developers work under a totally different set of constraints, according to session participant Eleanor G. Maurer, a supervisor of benefit systems for Blue Cross of Northern California. Applications developers aim to have their systems come in on time and within budget. However, this goal results in a system that may be good for the user, but was not designed to be in production, she charged.

"The development programmer may have been under pressure to get the system into production without worrying about the changes that will be required," she observed.

At Maurer's shop, the maintenance and development programming functions are separate. However, a maintenance programmer participates in the development process. "Maintenance programmers have knowledge of the production area that people in development don't have," she pointed out. Moreover, in working with the development team, the maintenance specialist becomes familiar with the new system.

Maurer views maintenance as part of the program life cycle: "Each maintenance task is a mini project," he said. In taking this approach, Maurer advocates a flexible development environment and makes use of structured programming techniques.

The programmers in the maintenance unit are often invited to participate in workthroughs with the user. The user is an extremely important part of the maintenance team because he "is the person who can give you the support in the testing phase and quality control."

Will Require 25% to 35% of Total Investment

Cost of Future 'Full-Blown' Net Outlined

By Phil Hirsch
CW Washington Bureau

HOUSTON — A "full-blown" local-area network management system will require 25% to 30% of the total network investment, according to Mark Stahlman of Wang Laboratories, Inc., a speaker at the recent National Computer Conference here. Stahlman used the future tense because the system he defined as "full-blown" is not yet available, although he believes that it probably will be within the next two years.

Stahlman, product line manager for communications systems at Wang, explained that a full-blown network managment system will involve much more than fault isolation and the limited performance measurement services provided by existing local-area network management systems. Specifically, future systems will monitor link-, transport- and high-level communication protocols for errors and report them to the network manager, along with an enhanced set of network performance measurements.

The new systems also will provide a means of converting this information into reports that isolate specific areas into which the network manager should look, Stahlman explained.

Asked at the end of the session why these enhanced local-area network management services have not yet been brought to market, Stahlman answered that, first, it is because implementing them is complicated and, second, that local-area network suppliers "feel a need to deliver on the commitments they've already made."

Among the other speakers at this NCC session was William Shipp, assistant provost of Brown University, which recently completed the installation of a local-area network connecting 110 campus buildings. The major problems encountered during development and implementation, he said, were nontechnical. Among them was the temptation to promote support for the basic local-area network concept by promising users more than could be delivered.

The local telephone company, concerned about loss of business, was also a problem, Shipp reported, adding that Brown found it necessary to create a separate organization to implement and operate the new network because "local-area networks don't fit under the computer center umbrella." The backbone of the Brown University network, which has some 750 terminations, was built in three months, Shipp said.

The total cost was about $1.3 million, which the university expects to recoup within two years from what it saves in local telephone charges.

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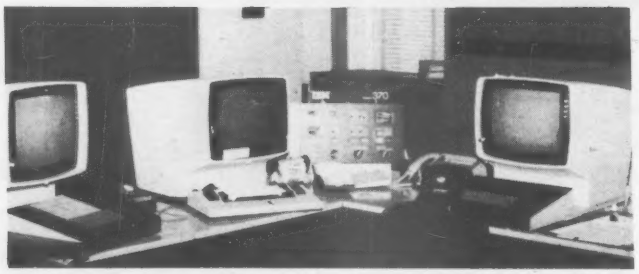

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Successful Sequence Listed

Speakers Outline Strategy of DDP Selection

By Brad Schultz
CW New York Bureau

HOUSTON — Is distributed data processing (DDP) too important to be left in the hands of DP professionals?

Two Arthur Andersen & Co. consultants presented a paper at the recent National Computer Conference acknowledging that top management has seized the initiative in DDP usage at many companies. The paper by Maurice Blackman and Hugh Ryan specified how DP professionals can select a successful strategy for building the DDP systems that top management orders.

Blackman and Ryan defined DDP as "a data processing technique that provides access to computing power for end users by means of multiple processors interacting through the planned exchange of data over communications lines." DDP strategy selection, they said, consists of the following sequence of tasks:

- Identification of applications.
- Identification of distributed functions.
- Analysis and selection of a configuration of hardware and data communications facilities.
- Selection of standards for data distribution.
- Development of a catalogue of software components.
- Selection of products.

The consultants named two groups of issues that make DDP implementation a formidable task: "logical puzzles that spring from the very nature of allocating processing between several processors" and "gaps in available technology that make some approaches more costly than others." The first group, they said, tends to linger after gaps in available technology are filled.

Selection Objective

The objective of DDP strategy selection is to configure a mix of hardware and software components that permits end users to access systems while optimizing performance, development cost, operating cost, time needed for delivery and ease of use, Blackman and Ryan declared.

DDP strategy selection occurs during a planning phase, they observed, adding that users must live with results of this phase for five, 10 or more years. That means the approach to selection should rely heavily on the experience, knowledge and judgement of the selectors, their NCC paper stated.

Regarding the application identification task in the task sequence that comprises strategy selection, Blackman and Ryan noted that, from the end user's standpoint, computer services are more convenient if they are accessed through a single workstation.

Hence, there is incentive to incorporate workstations individually capable of supporting a wide range of applications. Before workstation characteristics can be specified, however, the range and interrelationships of these applications should be identified.

Charts are a useful medium for expressing the range and interrelationships of an organization's systems applications, the consultants pointed out, and can serve as a requirements checklist.

Turning to the second of the tasks that comprise DDP strategy selection, Blackman and Ryan explained that "identification of distributed functions" refers to generic functions of the DP department, rather than specific functions of particular applications. Their paper cited three groups of generic functions: operations, development and management.

Operations functions were said to include data inquiry, data entry, validation, correction, file analysis, printing and posting. Development functions were said to include identification, justification, data design, screen-based reporting, process design, programming, testing and software conversion.

Blackman and Ryan said management functions include network design, capacity planning, equipment acquisition, software selection, standards making, network operation, performance reporting and data administration.

Operations Functions First

Of the three function groups identified during the second task of the DDP strategy selection process, operations functions should be considered first, the Arthur Andersen consultants advised. "Operations functions are dispersed when the local business unit has autonomy in its own day-to-day operations, when its operations are on different business cycles from those of its parent or headquarters and when its operations efficiency or effectiveness can be improved by rapid access to the results of computing," according to the consultants.

The paper, "Issues and Methods for Practical Distributed Data Processing Applications," is featured in the *1982 NCC Proceedings*, available from Afips Press, 1815 N. Lynn St., Arlington, Va. 22209.

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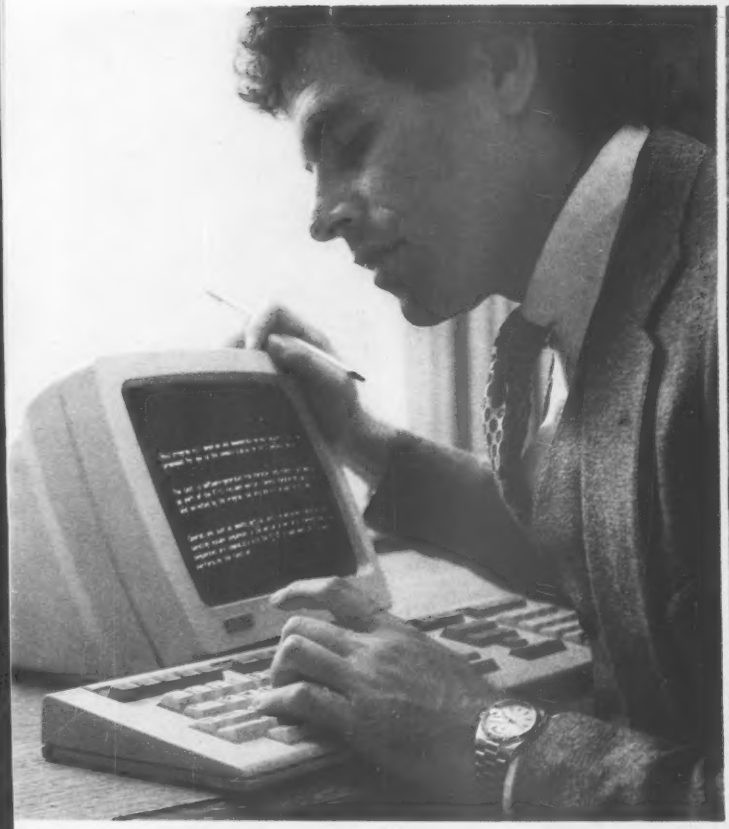

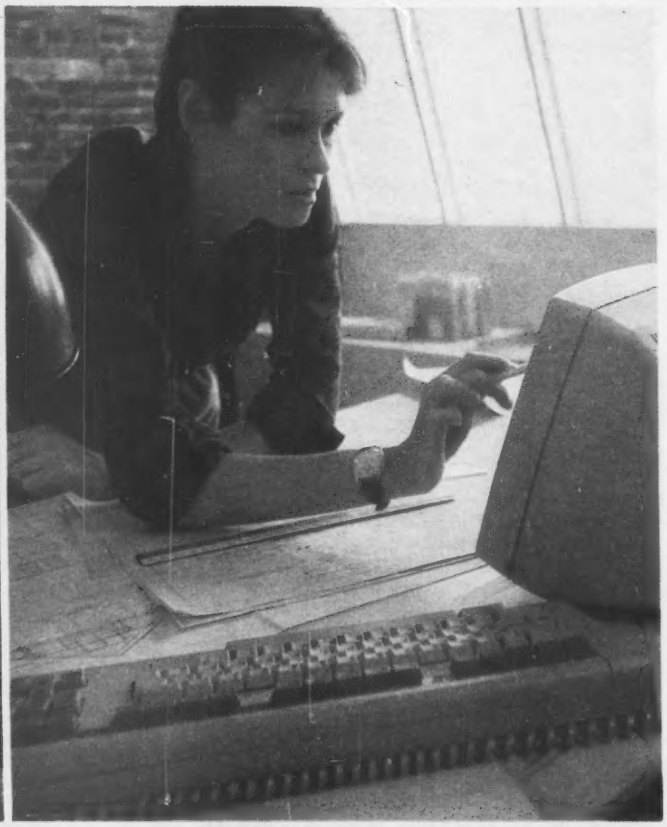

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Systems Implementation Said 'Deterministic'

By Brad Schultz
CW New York Bureau

HOUSTON — The recent National Computer Conference here was loaded with vendors trying to sell solutions to problems about which users have not thought about very much, according to Harvard Business School Prof. James J. McKenney.

In a conference session called "Linking Information Systems With the Business Strategy," McKenney said an organization's experience with information processing is deterministic, rather than evolutionary. In other words, systems cannot be implemented effectively unless certain resources, environmental conditions, management and personnel attitudes and other factors are in place.

"Everyone doesn't succeed [with information systems] if they just keep trying," the professor declared. An evolutionary process, such as the emergence of an animal species, is generally conceived as inexorable in the sense that some palpable result cannot be avoided, he indicated.

A Deterministic Process

A deterministic process is viewed as a sequence of events that can easily be prevented from leading to a tangible outcome, although what it would take to prevent fruition may not be known or feared beforehand.

An organization's experience with information processing is typically portrayed as evolutionary in models such as that propounded by McKenney's former Harvard Business School colleague, Dr. Richard Nolan, who left academia to found a consulting firm — the Lexington, Mass.-based Nolan, Norton & Co. — a few years ago. Tom H. Johnson, a Nolan Norton partner, based his presentation to the NCC session on Nolan's evolutionary model, which breaks the history of DP into six stages, corresponding to higher management's fluctuating enthusiasm for the technology.

After a honeymoon period called "initiation," DP is handled as a "contagion" in the organization, engendering competition among end-user departments for access to DP resources — until, in a third stage, higher management cracks down on the soaring budgetary allocations and political clout the DP department has typically won.

The Third Stage

Most U.S. companies are presently in the third stage. Ahead of them may be the point (stage five in certain versions of the Nolan model) when management of systems is divorced from management of information.

According to McKenney, the primary effect and intention of DP during the '60s was replacement of clerical workers. During the '70s, systems applications were aimed at improving managerial effectiveness. By 1980, however, systems were seen in many corners of the DP community as "overpromised," McKenney noted.

Based on a study of 38 organizations that he and Harvard Business School Prof. Warren McFarlan conducted over the past five years, McKenney noted that DP operates as "a powerful new organizational force" in a number of ways, hostile to "strong organizational habits."

AT&T inadvertently made the integration of computing and communications easier in the early '60s, he asserted, explaining that in 1963, AT&T asked the federal government for permission to offer Picturephones, a line of telephones that would have featured TV display of the opposite party in a telephone conversation. However, AT&T dropped plans for Picturephone when market surveys suggested that most people do not want others to see what they look like during a phone conversation, McKenney maintained.

Meanwhile, AT&T had developed circuits to support 56K bit/sec transmissions through its Bell System network. After the scrapping of Picturephone, these circuits were applied to data communications, ushering in a new generation of information exchange among remote computer systems.

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DBIS Meet Set For Aug. 23-25

LOS ANGELES — The National Conference on Data Base Information Systems (DBIS) will be held here Aug. 23-25 under the sponsorship of the University of California at Los Angeles (UCLA) Extension.

Emphasis at DBIS reportedly will be on programmatic approaches to information management, as well as implementation and applications of data base management systems. The conference, to be held at The Ambassador Hotel in Los Angeles, is being expanded this year to emphasize information management.

The conference will include vendor presentations in the evenings of the first and second days.

The registration fee is $595. More information may be obtained by contacting National Conference on Data Base Information Management Systems, P.O. Box 24901, Department K, UCLA Extension, Los Angeles, Calif. 90024.

Because Information Now Resource

Measurement Held Integral Part of MIS

By Robert Batt
CW West Coast Bureau

HOUSTON — The use of information as a resource means that measurement has become an integral part of a management information system (MIS).

This was the message delivered to National Computer Conference attendees in a session on "Concepts and Practice of Measurement in MIS." Attendees were told that the fundamental issue of what is to be measured in MIS has not been given the attention it deserves.

Richard Mason of the University of Southern California claimed that there has been a shift away from an emphasis on technology to an emphasis on using information as a resource. "Measurement is fundamental to information when considered as a resource," he asserted. "It is terribly important we understand the basis on which information is measured."

Mason argued that users interpret information based on certain management principles, the company culture and user psychology. The interaction of these three leads to action, he said.

It is important for DPers to understand the strategy of a company and how what they are measuring relates to that objective. Basic measurement areas include, he said, the market position, product leadership, innovation, employee attitudes, productivity and physical and financial resources.

Social Responsibility

Mason also emphasized the role of social responsibility in measurements: "There is certainly a need to collect data that will help you communicate with your community."

Mason, who chaired the NCC session, warned DPers against making information a by-product of some other activity in which the company is engaged. He recommended the setting up of information quality control circles which, he claimed, enable people in different organizational functions to monitor the use of systems through time.

Also speaking at the session was Burton Swanson of the Graduate School of Management at the University of California at Los Angeles, who urged the use of computer audits as a useful way of managing maintenance needs within an organization. Swanson argued that the focus in measurement should be on user attitudes and behaviors, but admitted that the relevant components of a user attitude are presently not well understood, making it difficult to obtain consistent results.

"Audits can be used to diagnose user information needs and requirements, and the feedback can be used as an instigator for development of new corporate systems where needed," he added.

Concluding the session, Vic Januelapis, founder of Positive Support Review, Inc., asserted that successful organizations will be those that respond most rapidly to technological change. The measurement of any business, he contended, includes the measurement of information and data needs and the creation of a charter or plan for information within an organization.

Many companies, he asserted, suffer from organizational discord because the MIS department is out of synchronization with the overall thrust of the company.

Developing measures must also take into account an organization's location, he warned, because different regional offices often have different needs.

"If you have an organization where developments are going in different directions, over time your competition may begin to run over you, and you will suffer excess costs," he said.

Without a good set of measures, a company is likely to make erroneous decisions and, according to Januelapis, measures must include what the competition is actually doing and where they are moving.

"What is required is a vehicle that will blend organizational thrust and define competitive advantage. We need to be able to measure the act of change," he concluded.

Workshop Set For Toronto

TORONTO — The 49th International Operational Data Security Workshop is slated to take place here June 28-July 1.

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Exec Sees Bulk of Drafters Not Yet Hit by CAD/CAM

By Jim Bartimo
CW Staff

HOUSTON — Computer-aided design and computer-aided manufacturing (CAD/CAM) will not reach 75% of manufacturing businesses for 10 or 15 years, according to Paul Quantz of Productivity International.

Quantz made that prediction at a recent National Computer Conference session on "CAD/CAM Applications and Development," based on his study of 325 businesses.

The companies he studied average annual sales of between $50 million and $100 million, and the total sales of all of them combined are $55 billion per year.

"We're still doing a small percent of the 'do-able' applications," Quantz said, pointing out that some 30,000 plants have not felt the impact of CAD/CAM. "Less than 5% of the 145,000 drafters in the U.S. are using CAD/CAM workstations," he said.

Although the cost of hardware in this area is rapidly declining, there are several reasons why businesses have not ventured into this advanced form of manufacturing. "The hardware is reliable but the software support is shoddy because it's so complex," Quantz said.

"Another problem is that everybody is waiting for the other guy to try it," he said. Other problems center around middle management's complacency, Quantz has found.

"People use money as an excuse, but top management is interested in diverting funds for the hardware," he said. "Top management is even a little defensive on the golf course when asked what they're doing with CAD/CAM."

Although many businesses are studying CAD/CAM further before experimenting with it, 20 of the 325 companies Quantz studied have a five-year plan to implement these systems. "The top 200 manufacturers in the U.S. are feeling the impact," he said.

"The use of CAD/CAM has changed the soul of the company. It has changed the way people feel about their jobs and it has spotlighted many procedural problems," Quantz said.

To build a CAD/CAM staff may increase a company's payroll by 15%, but this is offset by the 40% to 50% reduction in other staff that is felt.

"It's not a goal of CAD/CAM to get rid of drafters, it's a by-product," Quantz said. At one company studied, the drafting staff decreased by 7% per year since the implementation of the system.

Advantages of CAD/CAM include a reduction in waste and rework by one-third, a reduction in project cycle time by two-thirds to one-half and increases in quality and productivity, Quantz said.

Speaker Sees Graphics Moving Into Mainstream of DP, OA

By Jim Bartimo
CW Staff

HOUSTON — "If a picture is worth 1,000 words, it had better be a good picture," Dr. Sankunthala Gnanamgari of the Siemens Corp. said at a session on "Computer Graphics Applications" at the recent National Computer Conference here.

Exactly how to produce good graphics was explained by Anders Vinberg of the Integrated Software Systems Corp., a graphics software vendor.

"Computer graphics technology is good enough to do what we want it to do," Vinberg said. "This is a very recent development. I used to get laughed out of the room when I tried to sell graphics technology to designers. "Anyone can now use graphics," he said. "Graphics are moving into the mainstream of data processing and office automation."

Vinberg cited three areas of development in the graphics field. In the '60s, device independence was developed; in the '70s, device intelligence was developed. The development for the '80s will be layout intelligence, he predicted.

Although graphics technology is now available to nontechnical end users, there is still a problem with computer graphics, Vinberg said. Graphics software ideally should be device independent — that is, able to work with all graphics output devices.

"Don't back yourself into a software package that will only run on one kind of software," because hardware is constantly changing, he advised. Device independence also allows users with different needs to use the same graphics package.

However, device independence has proved difficult to implement because different ouput devices may change the graphics for the worse. For instance, a chart that is attractive in a report will not necessarily be attractive in a slide presentation, Vinberg said. The development of the '70s, device intelligence, is also ineffective, according to Vinberg:

"Device intelligence does not mean that the graph is good or even meaningful, it just means that the same ugly graph is drawn quicker."

Vinberg advocated layout intelligence, which is software that will "adjust the graphics to the limitation of the device. It ensures the best graphics and adjusts graphics to the intended application.

"A few years ago, you could not produce publication-quality graphics," Vinberg said. A skilled operator can now produce publication-quality graphics.

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Three Groups Involved

Quality Assurance Compared to Love Triangle

By Susan Blakeney
CW Staff

HOUSTON — Mark Holthouse said it was rather appropriate that his session on software quality assurance was "batting cleanup," falling on the last day of the National Computer Conference. As a quality assurance professional, he said, he almost always finds himself in the "cleanup" position.

Holthouse, from Analytic Sciences Corp. in Reading, Mass., made these comments while chairing a session titled "Software Quality Assurance Environments and Approaches" here at the recent National Computer Conference.

Software quality assurance, Holthouse explained, means different things to different people because there are so many different quality factors involved. He said software quality assurance could be likened to a "lover's triangle," including top management, the line systems group and finally the quality assurance group.

Communication Is Key

Following Holthouse was Barbara Taute, formerly part of an independent software quality assurance team for Peat, Marwick, Mitchell & Co., and currently of Time, Inc., who said communication is the most important element in quality assurance.

As the liaison between the vendor and the user, the quality assurance group must be able to play the part of "mediator, director, adviser and participant" and all the while strive to maintain independence.

Taute emphasized the need for a quality assurance group by recounting a case study of a typical organizational setting. A software quality control project with which she was involved included users who were unsure of the compliance test process, had difficulty communicating with the vendor and had insufficient staff members and forms for their new process that was not yet developed.

The steps for a quality assurance application that Taute recommended were outlined as follows:

- Develop a quality assurance review in questionnaire form.
- Specification sign-off.
- Test plan development.
- Test case assistance.
- Compliance test participation.

Taute described her idea of "the best fit" for an effective quality assurance group by listing the following characteristics for the group:

- People with state-of-the-art views.
- Multiple-level testing experience (maintenance, system and integration).
- Maintenance program responsibility experience.
- Applications systems development experience.
- Specific industry expertise.

"At its best, the quality assurance group can assure a trouble-free, well-controlled acceptance of a jointly agreed upon system," Taute concluded. "At its worst it is a costly, dependency-inducing process. In any case, both vendor and user have much to do to gain by the involvement of an independent quality assurance group."

CW Photo by S. Blakeney
Mark Holthouse

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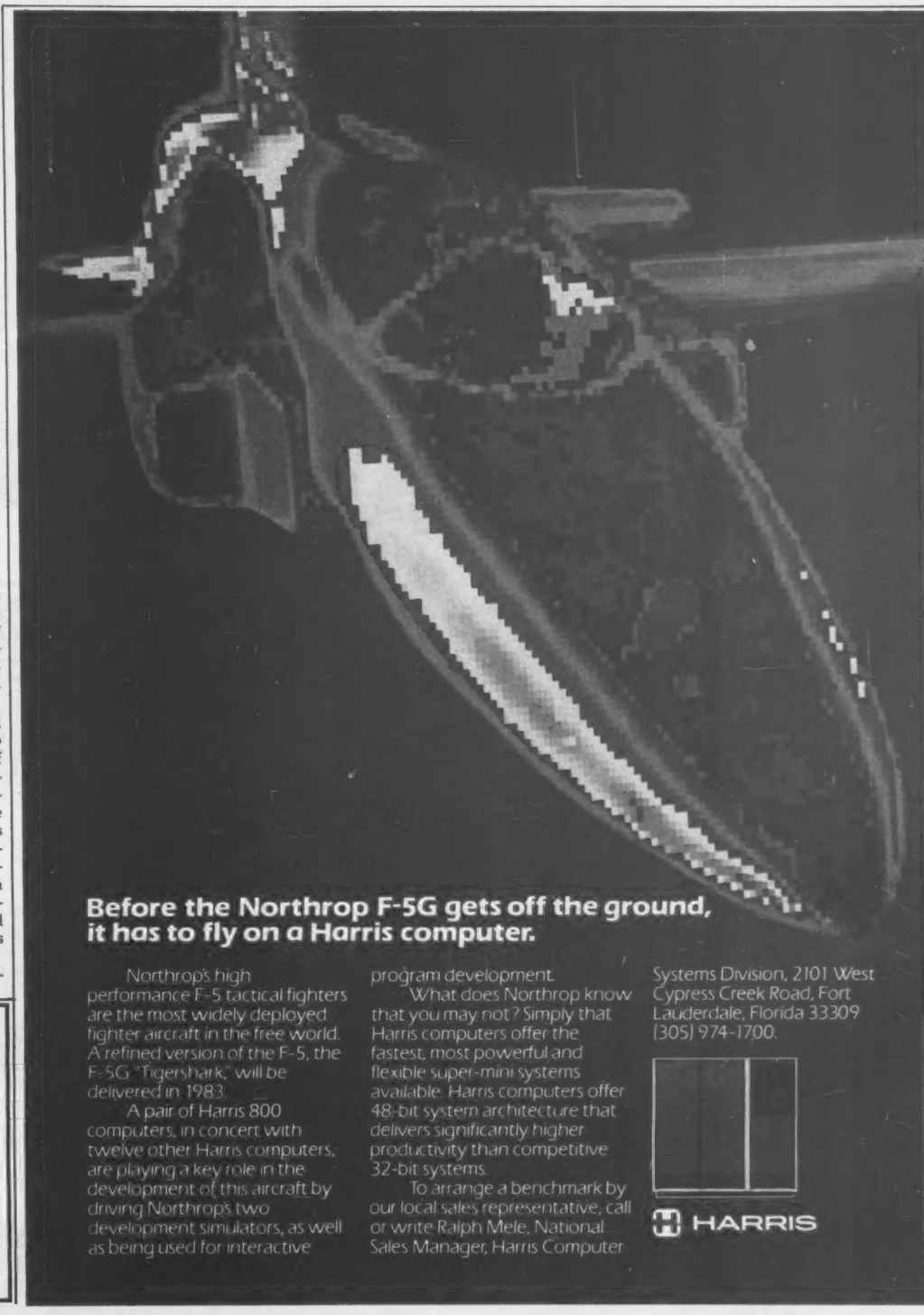

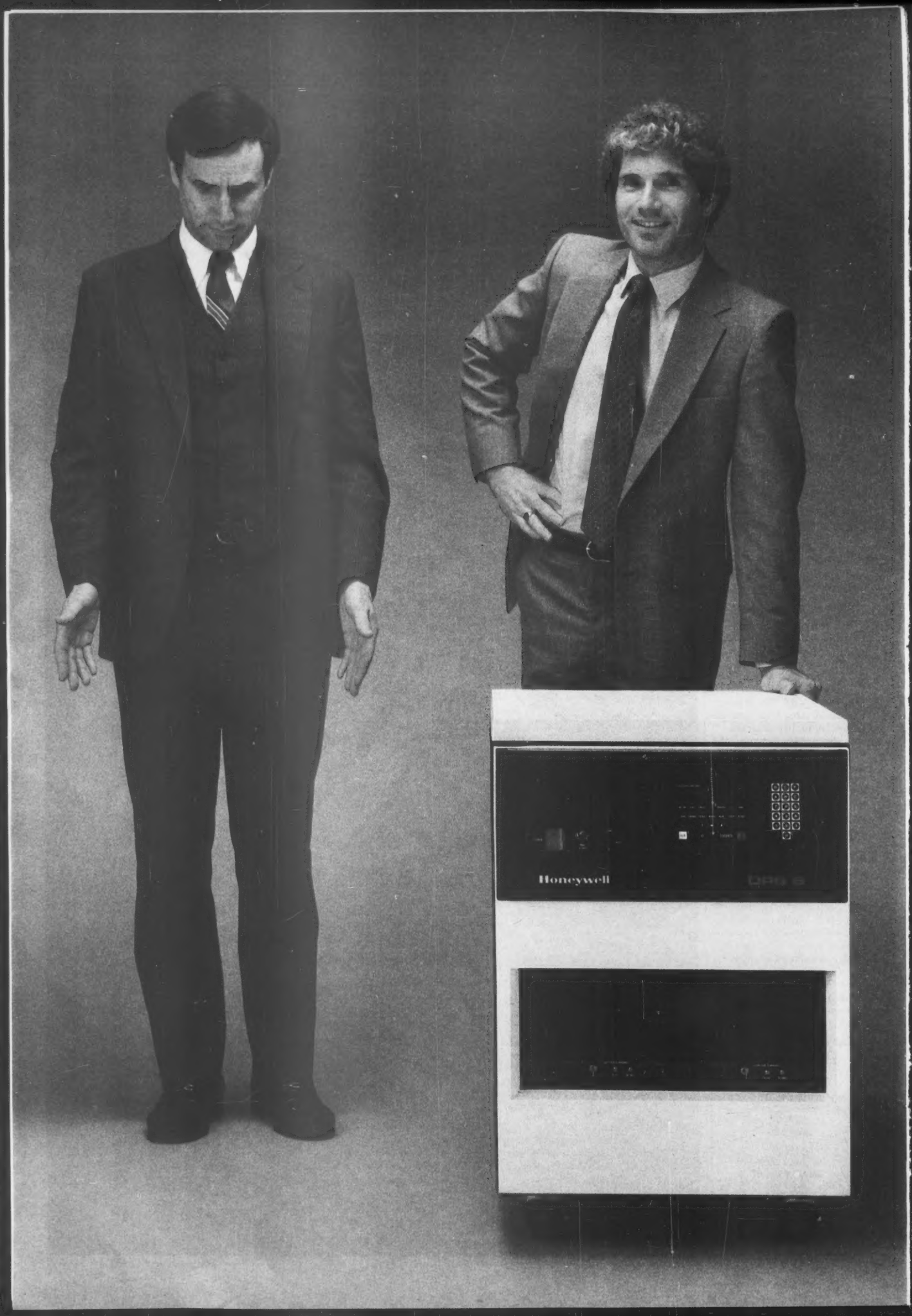
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Pioneers Clash on Von Neumann's Role

By Marguerite Zientara
CW Staff

HOUSTON — Polite controversy reigned at the recent National Computer Conference's Pioneer Day session on the origin of the "Stored Program Concept," an area of considerable disagreement among computer historians.

Featuring four pioneers from the days of the Eniac computer in the 1940s, the discussion centered largely on a man who was not present to promote or defend himself — the Hungarian mathematician John Von Neumann, dead for two decades. Credited by many with originating the concept of the stored program, as described in his June 30, 1945 "First Draft of a Report on Edvac," Von Neumann is held in less regard by panelist J. Presper Eckert Jr., who with John Mauchly developed Eniac to compute firing tables for the U.S. in World War II. Eckert is now at Sperry Univac.

Describing Von Neumann's visit to the University of Pennsylvania's Moore School in August 1944 — where work on the Eniac was being done — Eckert recounted that he and Mauchly freely discussed Eniac and Edvac with Von Neumann.

"I firmly believe that Von Neumann wrote up our ideas in his own words — ideas that we weren't allowed to publish because they were classified information — and deliberately failed to give us credit," Eckert charged.

"Virtually all of Von Neumann's ideas on the subject came from us," he continued. "I'm sorry there was so much difficulty in our relationship with Von Neumann. He was a very brilliant man and he caught on quickly.

"If we'd been able to work together, I have no doubt that we could have had a very beneficial relationship. I'm sorry he's not here to defend himself."

Wilkes' Argument

Maurice Wilkes, who worked on early British computer development, decried the "degree of credit that's given to Von Neumann."

While noting that he himself was in England at the time of the alleged discussions and was not privy to them, Wilkes, now at Digital Equipment Corp., remarked, "It's not often that something of such importance can be pinpointed. Everyone's contributions will perhaps never be elucidated.

"It is true that Von Neumann's draft report had the first clear statement of the whole business, and it had a wide distribution.

"Even though only Von Neumann's name appeared on that document, the concept should not be attributed to Von Neumann unless there is very cogent evidence to make that statement," he said. "While future historians may unearth more evidence, we probably have all the information now."

Von Neumann's valuable contribution was that he formalized the idea and he gave support to the stored program concept, Wilkes said.

"We owe a great deal to Von Neumann, but it is unfortunate that he is often credited with the invention of the computer," he added. "I hope it will be put right in reference to others."

Herman H. Goldstine, now at the Institute for Advanced Study, was the liaison between the Moore School and the Aberdeen Proving Grounds at the time of Eniac's development. Goldstine credited Bell Laboratories' George Stibitz, who developed an automatic interpolator, for his "very important contributions that have not received the recognition they deserve."

Recounting a diary-like list of memos and meeting dates regarding Von Neumann's association with the Eniac project, Goldstine asserted, "If one name must be mentioned as the developer of the stored program concept, it is clear that the name is Von Neumann.

"If more names can be mentioned, it would have to be the little group mentioned before — Eckert, Mauchly, Arthur Burks and myself," he said.

After all session presentations were made, Goldstine made the statement: "Maurice Wilkes is wrong about Von Neumann, who is not here to defend himself. Wilkes spoke of things he can't know of his own knowledge and I totally disagree with him."

Richard Clippinger, who worked at the Ballistic Research Lab at Aberdeen Proving Grounds and used the Eniac, declined to attribute the stored program concept to any one person.

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Postal Service Exec Sees Automation As Key to Self-Supporting Post Office

By Marcia Blumenthal
CW Staff

HOUSTON — "It's hardly a secret that some people think computers will put the Postal Service out of business, but I assure you our demise is not imminent," declared Gordon C. Morison, assistant postmaster general for the U.S. Postal Service.

Morison, one of three plenary session keynoters at the recent National Computer Conference here, also advised conference attendees that the Postal Service has mapped out a plan that integrates automation for both its business operation and mail distribution function.

Automation has helped the Postal Service become almost a self-supporting organization. This year the service will require only about 1% of its operating budget from public tax funds, Morison said. This compares to a 25% subsidy 10 years ago, he noted.

"We can overcome the loss of subsidy revenue only by having the authority to modernize the Postal Service.

"Volume mailers can no longer achieve cost-effectiveness without using automated services offered by the post office," Morison asserted.

It's amazing "how something that can be useful to all mailers has received such bad reviews," he said, noting the controversy over the nine-digit Zip Code, the service called Zip Plus Four by the Postal Service.

Zip Plus Four is the only way the Postal Service can fully automate mail delivery service, according to Morison.

But the law delaying the implementation of the nine-digit Zip Code until October 1983 does not discourage the Postal Service, he said. That law allows the Postal Service to take all steps necessary to take advantage of that new service, he added. "We can and we are buying and installing new equipment."

Zip Plus Four is a purely voluntary service — primarily a business mail system, Morison reminded NCC attendees. "The fact that the service is voluntary doesn't bother me. U.S. business has the capacity to adapt to the new technology benefits," said Morison.

Pointing to benefits already achieved through the use of automated Postal Services, Morison noted that the presorting programs have resulted in a 15% to 20% postal cost savings to users.

While electronic mail is already here, Morison said he did not see that putting a significant cramp on the demand for postal services. The mail mix will change, but the need for hard-copy delivery will continue, he said.

CW Photo by S. Blakeney

Gordon C. Morison

Calendar

July 11-15, Buffalo, N.Y. — **The Technology of Productivity.** Contact: International Manufacturing Systems Conference '82, 186 N. Water St., Rochester, N.Y. 14604.

July 12-13, Cincinnati — **Managing Documentation & Documentation Standards.** Contact: Carnegie Press, Center for Documentation Resources, 100 Kings Road, Madison, N.J. 07940.

July 12-13, Chicago — **Software: A Legal Briefing for DP Professionals.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

July 12-13, Sacramento, Calif. — **Structured Documentation.** Contact: Carnegie Press, Center for Documentation Resources, 100 Kings Road, Madison, N.J. 07940.

July 12-14, San Francisco — **Data Communications Systems.** Contact: Center for Advanced Professional Education, 11928 N. Earlham, Orange, Calif. 92669.

July 12-14, Sunnyvale, Calif. — **MVS Systems Management Workshop.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

July 12-16, New York — **CICS/VS Application Programming Command Level.** Contact: On-Line Software International, 65 Rt. 4 E., River Edge, N.J. 07661.

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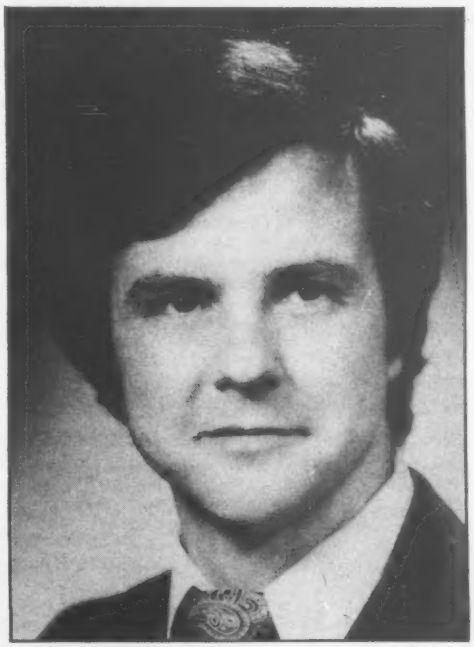

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EDITORIAL

Go Ahead and Whistle

Are you waiting for a data base standard? Don't hold your breath.

Although the American National Standards Institute has been working on it for the past 10 years, it does not seem to be any closer to providing any sort of standard.

A panel of data base researchers participating in the recent National Computer Conference in Houston broke the bad news [CW, June 14]. The researchers were representatives of Ansi and Codasyl evaluation boards and the National Bureau of Standards Data Base Study Group.

The word is that Ansi has changed its mind about seeking a single data base standard. Instead, it has decided to develop a series of data base models that will include the relational data model, the network data model, end-user facility, data model processing and architecture for data base standards.

Only recently has Ansi's X3H2 Committee decided to include the relational approach in addition to the structured approach it has evaluated in the past. This is hard to believe since this data model is growing in acceptance and availability every day.

X3H2, which has the major responsibility for data base standard evaluation, reportedly came close to agreeing on a standard in March 1981. However, the standard did not receive an approving vote; the drawback supposedly centered around the lack of a universal data definition language. The committee has been trying to regroup during the past year to develop a standard.

As usual, users were left holding the short end of the stick. It is a situation reminiscent of the controversy over the Cobol-80 standard. Even if a standard is decided upon — which at this point seems unlikely — users must be concerned with whether it will meet their needs or create additional problems for them.

One can only think that by the time X3H2 gets close to a standard, another data model will have emerged, and the committee will have to begin the process once again. If users have to depend on this type of evaluation process, they have little hope of seeing any standard within a reasonable time span.

Perhaps instead of discussing their lack of progress in an NCC session whose very title — "Research Toward Data Base Standards" — must have raised false hopes among attendees, the Ansi, Codasyl and NBS researchers should make an effort to complete the evaluation and give users the standard for which they have been waiting so patiently all these years.

Presently the attitude seems to be: "Waiting for a data base standard? You'll have to whistle."

DATA PAST

Five Years Ago
July 4, 1977

WASHINGTON, D.C. — The first piece of legislation aimed specifically at computer crime was introduced in the Senate.

The bill, sponsored by then-Sen. Abraham Ribicoff (D-Conn.), proposed to make it a crime to misuse the computer systems of the federal government, certain financial institutions and other entities involved in interstate commmerce.

Punishment for violators of the proposed law would be a jail term of up to 15 years and/or fines of up to $50,000.

Ten Years Ago
July 12, 1972

MIAMI — CBS News used a series of APL-based report-writing programs for analysis purposes during the Democratic National Convention. The programs were stored in The Computer Company's 370/155 in Richmond, Va., and were accessed through three Novar terminals at the convention hall, according to Warren K. Mitofsky, director of statistical research for the network.

Though APL was an "ideal language" for this application, he said, it was transparent to the terminal operators.

Gaining

LETTERS

Graphics Standards Support

As glad as I was to see the subject of graphics standards on the front page of *Computerworld* ["Vendors Eye Graphics Standards," CW, May 31], an important point was left out of the article, the omission of which left a very misleading impression.

Digital Equipment Corp., Tektronix, Inc. and Intel Corp. are indeed throwing their corporate support behind the development of graphics standards. However, they have chosen to work within the American National Standards Institute (Ansi) framework for the generation of those standards.

The decision to support the current efforts of the Ansi X3H3 Committee on Computer Graphics is to be heartily applauded as a giant step toward nationwide portability of graphics programs and programmers. Such corporate cooperation is very rare and badly needed.

Madeleine Sparks
Graphics Systems Scientist
Science Applications, Inc.
Huntsville, Ala.

Consider Communications

John Murray's In-Depth article, "Contingency Planning" [CW, May 10], was excellent, as far as it went. One topic that was left out was communications.

In the current DP environment, communications is almost as important as processing power, and a communications loss can put many businesses completely out of action.

I think that it would behoove all data center managers to consider communications restoration as a very important part of their disaster contingency plans.

Hiram J. Eberlein
AT&T Long Lines Division
Albany, N.Y.

Reassurance

These days, people are talking about the Japanese invasion in the computer industry. I would like to express my opinion from my experience.

Have you ever heard of an operating system made by the Japanese? Have you ever heard of any computer architecture made by the Japanese? It seems to me that the Japanese are not very original. They cannot make operating systems or computer architecture like they can philosophy. Of course, the Japanese are very talented in modifying or improving what they have digested.

If you or your company has originality, don't worry about it. You are still in good shape.

Makoto Kawakami
Takatsu-ku, Kawasaki, Japan

OA Not the Problem

I picked up a recent issue of *Computerworld* to find two letters to the editor [CW, May 31] opposed to 9 to 5, the women office workers' organization. My curiosity was piqued as 9 to 5 is an organization I have respected for some time.

Karen Nussbaum of 9 to 5 ["9 to 5 President Raps Office Automation," CW, May 10] goes to great length to stress that office automation is *not* the problem. She clearly states that the design and implementation are the issues of concern.

Implementing new office procedures (automated or not) in ways that do not take into account the potential risks to health, well-being and satisfaction of the workers (women, in this case) is irresponsible and disrespectful.

Christine L. Hammond
Woods Hole
Oceanographic Institution
Falmouth, Mass.

SOFTLINE / Werner L. Frank‡

Some Suggestions for Improving Productivity

COMMAND LANGUAGE BABEL

LOGIN	LOGOUT	SAVE	DELETE	WRITE
LOGON	LOGOFF	KEEP	SCRATCH	OUTPUT
HELLO	BYE	FILE	PURGE	PRINT
SIGNIN	SIGNOUT			DISPLAY
SIGNON	SIGNOFF			LIST

Table 1

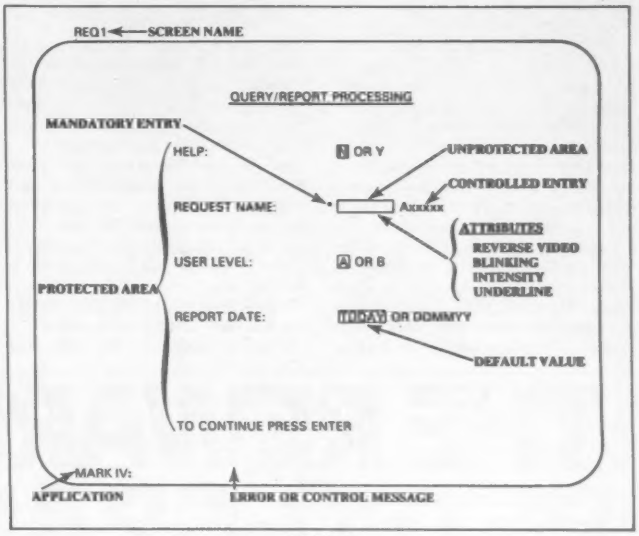

Table 2

As we move into the 1980s, there is no way to overlook the mounting backlog of applications begging for a solution. The search for ways to improve application development productivity continues to grow.

Two popular suggestions for meeting this problem are the adoption of prototyping schemes and user-friendly systems. These two methods of simplifying the implementation of computer-based applications do make a contribution, but they do not affect the underlying, more serious issue that needs attention.

This has to do with establishing an environment more conducive to promoting productivity. I am referring to technical standards and procedures that will ease the learning requirements for development and make the operation of an application more accommodating.

First, let us consider the present impact of layers of languages. On both the mainframe and the flourishing personal computer, the typical application builder and application user are confronted with more than a dozen different languages, ranging from the programming language itself to the job control language to the command language of the operating system and to the specific application-oriented semantics and syntax inherent in the execution of the application.

In addition to the profusion of languages, there are also a number of dialects. Take, for example, the typical command language that might be found in a mainframe interactive system environment as well as in a microprocessor-based operating system. Each innovator of a system seems compelled to adapt yet another standard term, or even invent a new term, in order to create a product differentiator.

Unfortunately, this has led to a number of alternative labels, all of which mean essentially the same thing. As shown in Table 1, plenty of evidence exists that this proliferation of terminology does not really accomplish much.

This table alone illustrates that it is possible, by selecting one term out of each of the columns, to create more than 1,000 command-language variants. This is hardly worthwhile and certainly gets in the way of the ultimate user, whose learning and utilization of the system could be immeasurably enhanced by agreed-upon standardization.

Since much of what we currently do involves the CRT terminal, all of us are confronted by computer-generated screens. The variation in screen organization obliges us to relearn and adapt from system to system and even from application to application. At the very least, one would expect screen formats within a single application to have some form of standardization, but even this is not necessarily true.

As shown in Table 2, it is possible to

(Continued on Page 32)

HUMAN CONNECTION / Jack Stone‡

Manager's Professionalism Wins Users' Respect

This is Part 8 of a continuing series on how to succeed as a data center manager.

It's an uphill, grueling battle for a data center manager to win the respect of a user community that continually airs its complaints about DP services around the organization and, even worse, to top management.

I'm certain that one could find a textbook that would provide a theoretical answer to this challenge in the form of some soothing, sage formula. However, Stephen Roberts faced this situation in real life as the head of administrative systems for the Catholic University of America in Washington, D.C.

"My task management reports were the starting point for improving user communications since they provided a documented inventory of user tasks.

"It should be noted that it took many months before the list was complete because the systems staff was unhappy about having such 'controls' placed on them and were reluctant to enter each and every task into the system.

"Then came the matter of my own training. We had about a dozen production systems at the time, several on-line, and I spent about a third of my time during the first year of my tenure literally living with the user departments and studying — rather than arguing about — their operations.

"It was hardly my choice to work 14 to 16 hours a day, six to seven days a week during much of this period, but I had to have some detailed knowledge about these systems in order to set task priorities intelligently. I knew I would have to make this level of personal commitment in the short run to bring systems development operations and user communications under control in the long run.

"Armed with task reports plus a newly acquired understanding of user operations, I waited for the right time to begin discussions with user departments on their revised demands. The time was ripe when a key user was 'blowing his cork' to me about a system failure that he attributed to our performance when, in fact, I knew full well that the failure was the direct result of an operational problem in his own department. The user's misdirected criticism gave me the opening to launch an effective counteroffensive.

"At face-to-face, but private and successive meetings with each major user, I usually started the discussion with a unilateral statement, expressed in clear and no uncertain terms: that we would never again tolerate his placing the blame on us for systems problems of his own doing; that if he makes charges or points fingers or writes letters about our performance in the future he had better be able to prove them because if a problem is not our fault we will defend our position vigorously; that the past policy of center obesiance to user whims for systems tasks is terminated; that the long-range plan for him now consists of a single set of ordered tasks; and that he could set the priorities he wishes, but there would only be one top priority task and this task alone would be worked on until its completion.

"I was ecstatic about the results. One user after another quickly accepted my statement and agreed to abide by the task priorities and even wanted to let me set priorities. Unjustified criticism of the center vanished, and we were able to get to work to solve our internal problems without harassment from the users.

"The tactic worked for a number of reasons. First, the users were in a state of partial shock because this was the first time that the usually submissive DP organization had rebelled against their oppression. Second, they felt I knew what I was doing because I had spent enough time with the users to find the 'skeletons' in their operational 'closets.'

"Third, I sincerely wanted to resolve user problems so I provided my personal services to correct operational deficiencies in the user departments that were clearly their problems and had nothing to do with data center responsibilities."

Letters to Stone should be addressed to him at Box 270, 1377 K. St. N.W., Washington, D.C. 20005.

Suggestions for Improving Productivity

(Continued from Page 31)

develop standardization of screen organization and presentation. It appears quite natural that the title of the screen should be on the first few lines.

It is not, however, an accepted standard for the operating mode indicator, command entry point and error message return to be either on the first or last line of the screen, yet it would be a very simple matter to make a decision one way or the other for purposes of standardization.

There are some other features that ought to be common to all terminals, especially those operating in block mode. There ought to be a visible indicator for mandatory data entry points. There also should be a capability that would permit moving cursors from entry point to entry point as well as the ability to restart entry for a particular screen.

The benefits to be realized from such display standardizations are twofold: recognition factor and muscle memory. Both help facilitate the operator's learning process and minimize errors in subsequent use.

Next we have the issue of data files. The lack of standardization of data files for the purposes of data interchange creates a real problem. This problem is magnified by the current explosion in the use of microprocessors and the desire to take advantage of the rich variety of software becoming available from many sources.

Now it is more desirable than ever to move data freely back and forth among word processing systems, spreadsheet analysis applications, graphics systems and data management systems. Equally desirable is the ability to extract data from mainframe computers, download and combine such data with locally operating applications functioning on desktop computers.

There are, of course, efforts under way to fill this need. With individual operating systems, the problem has a chance of solution, as with files that follow the CP/M structure or files that are created within a Bell Laboratories' Unix operating environment. But it is one thing to be able to open a file; it is a more complex matter to be able to read intelligently and manipulate that file.

Two solutions to this problem are currently being advanced. The first comes from Visicorp, the creators of Visicalc, who quite understandably recognized the potential impact on computer users of being able to transfer data files in and out of Visicalc.

High Consequence

The issue is of high consequence, if only because of the use of this spreadsheet analysis product. Thus was born the concept of the DIF file format advanced by Visicorp. This approach attempts to establish a standard for exchanging data between application programs.

A more limited response to the need for integrating the principal generic software modules comes from Context Management, Inc. of Torrance, Calif., and its newly announced product, the Context MBA. This product, initially operating on the IBM Personal Computer, has a common data structure upon which any one of its four principal products can operate, including a spreadsheet analyzer, graphics system, data manager and word processor.

However, this answer to the issue of data standards is limited to a single supplier and therefore does not meet the general objectives set forth above for industrywide needs.

A final issue concerns the promise of software portability. This is the one area of computing that has best risen to the occasion, especially as it relates to the microprocessor.

Given the powerful combination of certain well-used application development languages and widely installed operating systems, the difficulty of moving from one computer vendor's hardware to a second has decreased by several orders of magnitude. Therefore, combinations of CP/M and Microsoft, Inc.'s Basic, Unix and "C" language or the UCSD P-System with any one of its associated compilers establishes the application builder in a very powerful position.

Application software, developed within any one of these three families, can be moved between hardware systems at an exceedingly low cost and in a short period of time. Perhaps this has provided the most substantial benefit to productivity in computing in the last 20 years.

Frank is executive vice-president of Informatics General Corp. in Woodland Hills, Calif.

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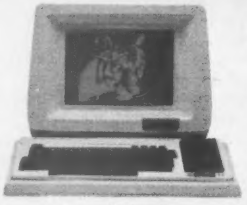

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(either transmitted by the host or entered from the keyboard) will cause the terminal to draw a pie chart sector with a radius of 200 and fill in the area between 90 and 120 degrees. The filled area can be a color in the case of GEN.II Color Retro-Graphics™ products, an intensity level in the case of gray scale GEN.II, or a shading pattern in the case of monochromatic GEN.II.

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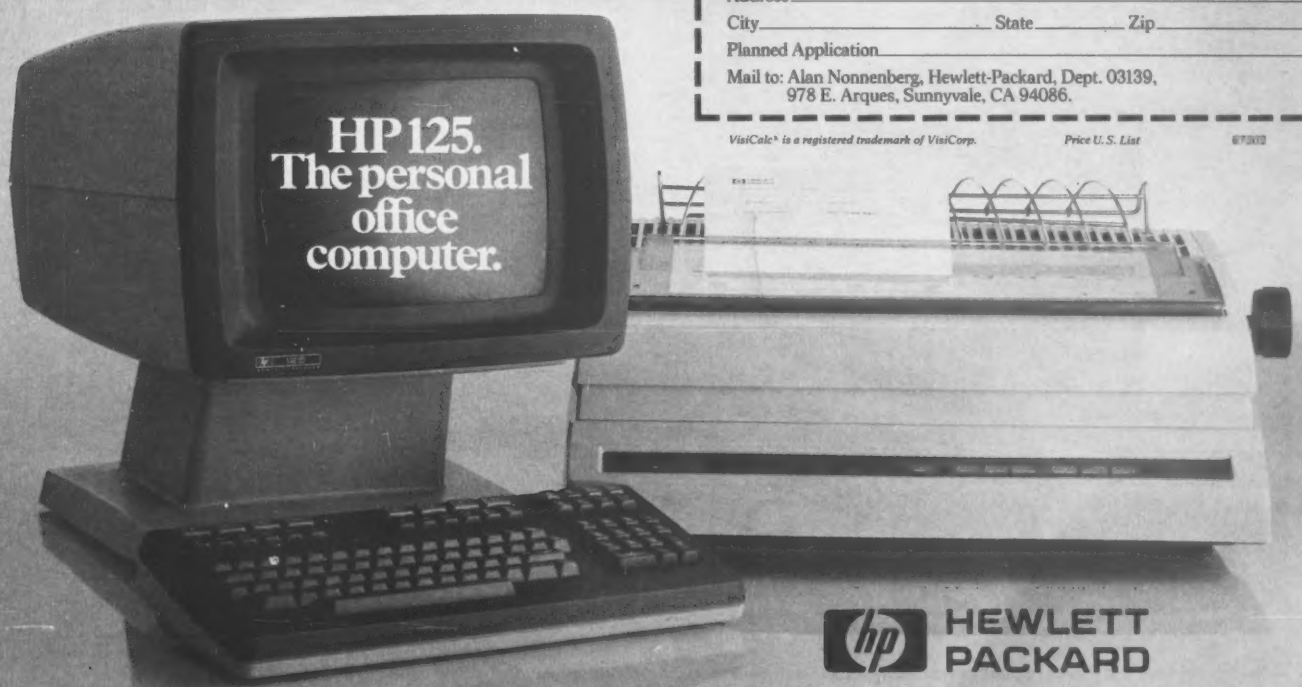

HEWLETT PACKARD

LETTERS

Lessons of Technology

I was disturbed by the recent article reviewing Jean-Jacques Servan-Schreiber's testimony before the House Science and Technology Committee ["Servan-Schreiber Sees 50 Million Jobless by 1990," CW, May 24].

Servan-Schreiber seems to suggest that technology is at once the problem and the solution, a view that is simplistic and reflects a serious mistake that Westerners have been making since the Reformation: ignoring the relationships among the various aspects of our existence.

The complex relationships among the various aspects of life, economics, politics, culture, art, religion and technology suggest that we will always be rather inept at predicting the effects of a change in any one aspect, including technology. The important problems of mankind embrace many of these aspects and will resist solution by the application of technology alone since technology does not exist in a vacuum.

These are the important lessons of technology that we have learned the hard way and that we must communicate to the rest of the world. We should be cautious of change to the extent that we can control it unless we are prepared to live with its iatrogenic effects.

We should certainly avoid promoting technology in underdeveloped countries, except in a very incremental and evolutionary fashion, given our ineptness at predicting the long-term effects of it.

The magnitude of problems in Western culture should humble us in terms of solving problems in any culture, our own or others, especially when the solution involves the application of technology. Servan-Schreiber's attitude seems to lack this humility.

Cary Coovert

Boston, Mass.

Supports University

After reading Ruby Kutzer's letter to the editor on the controversy over the education of computer professionals [CW, May 31], I must speak out on the side of the university.

Kutzer states "that IBM can teach a Cobol course in a couple of weeks while the university takes a full semester."

The IBM course will take approximately 90 hours to complete (two 40-hour weeks and 10 hours after class for work assignments). The university course will take approximately 96 hours (three class hours per week for 16 weeks and an equal amount of time for homework and practice exercises).

Kutzer has overlooked the fact that in a university environment, unlike an IBM course, the student is concurrently studying four, five or six different courses.

Eugene Blaettler

Lancaster, Pa.

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Problem Exchange Provides Solutions

NEW YORK — Generation Sciences, Inc. has developed a system generator said to allow the user to capture system design specifications as well as to audit and edit them.

Gamma also allows the user to report the design information formally in an iterative, generated design manual; generate all required application source code, maps, job control and test data from the design specification; and manage the development and implementation effort.

Gamma runs on computers that support ANS Cobol and a keyed-access method and generates Cobol-based applications, the vendor explained.

The Designer (design manual production) component licenses for $40,000 and the Programmer (Cobol code generation) component costs an added $35,000. A lease to license conversion option is also available from 10 E. 40th St., New York, N.Y. 10016.

'Jars' Users Gain IBM DOS Option

MCLEAN, Va. — Johnson Systems has introduced the IBM VSE/ICCF (Interactive Computing and Control) Interface, an option for its Job Accounting Report System (Jars). The package will run on any IBM hardware using the DOS operating system.

The interface is said to measure and bill equitably each ICCF user for all resources used. Johnson Systems' software provides a comprehensive data base which includes information on the computer activity for batch, on-line, interactive, timesharing and personnel resources.

With the interface, users will be able to plan for and optimize the use of ICCF, the vendor said.

Jars allows the data to be summarized at any level for long-term trend analysis and complete chargeback. With the report-writing capability, users can define reports in the format desired and can specify the appropriate level of detail or period of time, the vendor said.

The interface is available for $2,000 from Johnson Systems, 8300 Greensboro Drive, McLean, Va. 22102.

Omicron Aims to Recover Missing 'People' Link

By Marcia Blumenthal
CW Staff

NEW YORK — For one year James B. Webber and Howard D. Rothman worked at the same company — a career development firm for management information systems (MIS) professionals. They would pass each other in the hallways, nodding cordially but rarely speaking. One day Rothman popped into Webber's office and suggested going to lunch.

During lunch the two men discussed everything under the sun, including how they approached their jobs. The lunch lasted for five hours; the friendship continued for the next 12 years as each man moved on to different companies.

Over the years, Rothman and Webber continued to meet for lunch, bringing along new people, forming a small group of management information and human resource professionals, who exchanged ideas on how technology impacted their respective organizations. Finally, deciding the informal information exchange in which they had been engaged for the past several years was the kernel for a company, a little more than a year ago the two formed Omicron System, which was dubbed The Center for System Humanics.

What is system humanics? Simply stated, it is the recognition that people are the link between information technology and the goals of an organization, explained Webber, the firm's vice-president, during an interview here recently.

Vendors have driven technology so far down the road that it is important for information personnel in companies to learn from each other what level of technology is tolerable in the organization, Webber continued.

In putting the company together, the principals of the firm established a Participant Advisory Board comprised of high-level management information and human resources executives. These people are not a figurehead group, Webber noted. They think up the issues to be discussed at the interchanges Omicron System sponsors and play a role in selecting "contributing resource organizations," which to date have primarily been consulting firms. "We decided ideas should not be generated by Rothman and Webber sitting in a

(Continued on Page 42)

CW Photo by M. Blumenthal
Jim Webber

Generator Captures Design Specs

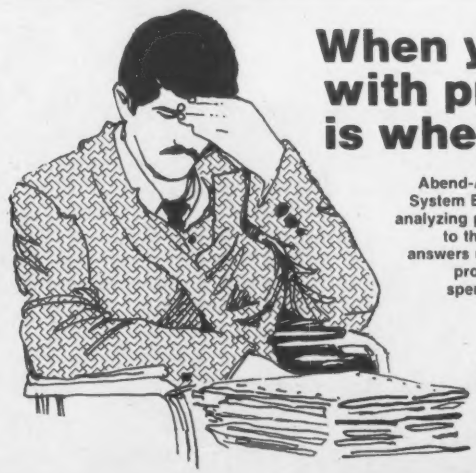
When you have a problem, who do you talk to about it except the people around you? asked Edwin S. Gaites, vice-president of information resource management for Westinghouse Broadcasting and Cable Co.

Recently, Gaites has been able to exchange ideas with his peers at other companies by participating in interchange meetings organized by Omicron System.

"I find the problems my peers have are the same, but the approaches to the solutions are different," Gaites explained.

At one interchange on recruiting, the facilitator of the session threw out the idea that defining what kind of business you are in is as important as interviewing and hiring a DP professional. "I had always

(Continued on Page 42)



When you think about it, the problem with program abends is when you think about it.

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Provides High-Level Language

Carleton Unveils '82 Version of 'Auditec'

BOSTON — Carleton Corp. has announced the 1982 version of its Auditec package, a generalized interface designed to allow application programs access to a number of data base environments.

The package provides a high-level language for the description of reporting, analysis and output programs. The program descriptions are analyzed in conjunction with file definitions previously stored in a data dictionary.

The program descriptions are then used to produce Ansi Cobol applications programs, the vendor said.

The '82 Auditec package contains a generalized interface that allows users to access data stored in IBM's IMS/DB and Cullinane Database Systems, Inc.'s IDMS/DB data base management systems. An implementation of the interface for Cincom Systems, Inc.'s Total; Software AG of North America, Inc.'s Adabas; and Intel Corp.'s System 2000 data base management systems is in development, said a Carleton spokesman.

The package costs $17,500, Carleton said from 44 Bromfield St., Boston, Mass. 02108.

On-Line Menu, Daily Bulletins Enhance UCC's Information File

DALLAS — An on-line menu, on-line user training and on-line daily bulletins have been added in Release 6.0 of University Computing Co.'s (UCC) Customer Information File (CIF) software system.

Other enhancements to the product include expanded capabilities for U.S. nine-digit Zip Codes, international postal code support and a front-end logical processor that applies application batch transaction to UCC CIF for automatic updating.

This software is used by the financial community to centralize information on a customer's total accounts relationship. It runs on mainframe computer systems compatible with IBM's OS/VS, MVS, DOS/VS and DOS/VSE operating systems.

Prices for the CIF vary, depending on operating system, but the system is base-priced at $56,000. The vendor is located at UCC Tower, Exchange Park, Dallas, Texas 75235.

'LR' Software Out for PDP-11s

NEW YORK — Lime Trea Computer Systems, Inc. has announced a labor reporting (LR) package — an industrial software module for Digital Equipment Corp. PDP-11 series processors.

The LR package includes two programs: LR/Maintain is a general-purpose script-driven data management system. It was designed to create and maintain employee, department, job, operations and products files as well as maintain production records. LR/Report is a report generator that produces employee performance summaries, job summary reports, job detail reports and product cost analysis.

A single CPU license for LR costs $700, the vendor said from One Penn Plaza, New York, N.Y. 10001.

'DDS/34' Targets System/34 Users

CHICAGO — Freedom Systems, Inc. has released a dental practice management and accounting system running on the IBM System/34.

The DDS/34 is said to perform practice, private and third-party insurance billing, accounts receivable, office and doctor productivity analysis, treatment plans, insurance preauthorization, patient activity and history inquiry, referral processing and recall. Additional modules can be added to handle appointment scheduling, word processing, accounts payable, payroll and general ledger requirements, the vendor said.

The DDS/34 is priced at $12,000 including installation, user documentation, data conversion assistance and one week of operator training. Additional modules are priced between $1,000 and $2,000.

Freedom Systems is located at 222 W. Adams, Chicago, Ill. 60606.

Cobol Programs Gain 'Doktor'

MINNEAPOLIS — Commercial Programming Services, Inc. has introduced a productivity aid designed for mainframes using Cobol programs.

Doktor is said to create hierarchical flowcharts with each program compile. The software reportedly facilitates program walk-throughs, makes code changes for maintenance easier to find and creates automatic program documentation.

The package costs $2,995 from Commercial Programming Services, which is located at 7400 Metro Blvd., Minneapolis, Minn. 55435.

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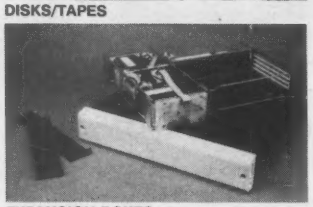
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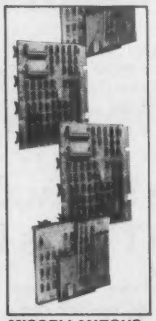
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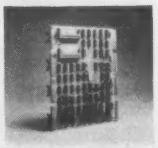
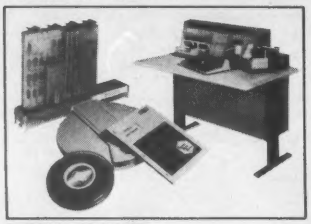

MEMORIES/COMM

VIDEO TERMINALS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RM02-AA	SOLD OUT ES SOLD OUT 240 SOLD OUT 76 SOLD OUT H9691, 120/60	SOLD OUT	3 SOLD OUT	14210
RM03-AA	SINGLE ACCESS 67 MBYTE 3600RPM CDC 9762 DISK, H9691, 120/60	20300	30%	14210
RLV11-AK	LSI/11 CTL + RL01 + RL01K-DC	6400	30%	4480
RL11-AK	UNIBUS CTL + RL01 + RL01K-DC	6400	30%	4480
TAPES				
TU58-VA	TU58-VX (DUAL DRIVE), TU58-VB (I/O CABLES, MEDIA, DC PWR CABLE)	1500	50%	750
EXPANSION BOXES				
BA11-PE	6 SYSTEM EXPANDER BOX W H7420-A PS, NO CORE REG, 120Vac	4150	50%	2075
BA11-VA	H9281-BA, H7833-A, 120Vac (13.4"W, 3.6"H, 11.7"D)	700	50%	350
H334-E	H334-X W H7872-A POWER SUPPLY, 120Vac	1350	50%	675
CABINETS				
H9610-AC	11V03-L CAB 30" W/O POWER CNL	1350	50%	675
H9612-AC	11T03-L CAB 40" W/O POWER CNL	1690	50%	845
H9613-AC	40" CAB W/SOLID TOP W/O PC	1690	50%	845
MISCELLANEOUS				
FP11-EA	FLOATING POINT (23 + 9 OR 55 + 9) PROCESSOR, H7421-C, 120Vac	6400	70%	1920
KE11-E	EXPANDED INSTRUCTION SET (MULTIPLY, DIVIDE, SHIFTS), FOR 11/35, 11/40	1900	53%	900
KE11-F	FLOATING POINT INSTRUCTION SET FOR 11/35, 11/40	1900	53%	900
KT11-D	MEMORY MANAGEMENT FOR 11/35, 11/40	3350	55%	1500
KY11-LB	PROGRAMMERS CONSOLE	950	30%	665
REV11-A	EXT REFRESH + BOOT + TERM	360	53%	170
REV11-C	EXTERNAL REFRESH + BOOT 1	360	53%	170
VK8-AB	SOLD OUT 780 SOLD OUT FL SOLD OUT CH SOLD OUT	SOLD OUT	7 SOLD OUT	315
COMMUNICATIONS				
DPM23-A	KDF11-AA, MSV11-DD, ISV11-B, BA11-NC, QJ642-AZ RSX-11S, QJ658-AZ, 120Vac	11500	30%	8050
DPM50-FA	INTELLIGENT I/O SUBSYSTEM KDF11-AA, H333-A TEV11, MSV11-DD, ISV11-A, QJ642-DZ RSX11-S, QJ655-DZ, QJ658-DZ, 120Vac	11450	30%	8015
DRV11-00	PARALLEL INTERFACE UNIT	300	15%	255
H326W	H326 EXCEPT NO COVER OR STRAIN RELEASE	275	50%	135
DRV11-J	64 LINE PARALLEL INTERFACE	450	20%	360
DLV11-F	EIA & 20mA ASYNCH SLU	370	30%	255
DH11-AA	16 ASYNC LINE MUX DIST PANEL & 120Vac PS PROG LINE SPEEDS	8800	50%	4400
ISB11-A	SOLD OUT SE SOLD OUT INTR SOLD OUT A, M8202-YE 56KBAUD, 1 WIRE DAISY CHAIN TO RT800 SERIES	SOLD OUT	SOLD OUT 70 SOLD OUT	2535
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PART NUMBER	DESCRIPTION	LIST PRICE	DISCOUNT	SALE PRICE
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LA36-CE	KEYBOARD DECWTR 120/60 20mA	2970	80%	550
LA36-CJ	KEYBOARD DECWTR 240/50 20mA	2970	80%	550
LA36-DE	LA36-DK W/20mA	1835	70%	550
LA36-DK	LA36 20mA W/O CABLE 120/60	2695	80%	535
LA3-DN	LA36-DJ W NO RIBBON, PAPER, CABLE, 240/50	2695	80%	535
LA36-HE	KEYBOARD DECWTR 120/60 EIA	3080	80%	615
LA35-CE	REC ONLY DECWTR 120/60 20 mA	2475	80%	495
VIDEO TERMINALS				
VT55-FA	GRAPH TERM W/COPY 120/60 20mA	5830	70%	1745
VT110-AA	DPM01-M + AVT100-AA, 120 Vac USA LINE CORD	6325	50%	3160
VT52-AC	SOLD OUT RE SOLD OUT 9 SOLD OUT SOLD OUT 100/120 Vac, 50/60 Hz	SOLD OUT	85 SOLD OUT	500
VT62-AC	WITH EIA W CONT. 120 Vac	3350	85%	500
VT100-NB	SOLD OUT VT SOLD OUT OR SOLD OUT 24 SOLD OUT	SOLD OUT	2 SOLD OUT	1500
VT110-AB	DPM01-MS + VT100-AB, 240Vac USA LINE CORD (50Hz)	6325	50%	3160
VT55-FB	VT52-BB W GRAPHING CAPABILITIES, 220/240Vac 50/60 Hz	5830	70%	1745
MEMORIES				
MF11-UP	32KB CORE IN DOUBLE SYSTEM UNIT, ROOM FOR ADDITIONAL 32KB. UNIBUS INTERFACE	9600	84%	1500
MF11-WP	64KB CORE IN DOUBLE SYSTEM UNIT, ROOM FOR ADDITIONAL 64KB. UNIBUS INTERFACE	10100	75%	2500
MK11-BE	128 KBYTE MOS MEM EXPANSION (2 M811-KE)	17200	70%	4995
MM11-DP	16K 18 BIT 18 MIL PARITY MEM, ONE 1" BOARD	5750	70%	1725
MM11-UP	32KB CORE, ADD-IN FOR WF11-UP	8600	86%	1200
MM11-WP	64KB CORE, ADD-IN FOR MF11-WP	8500	76%	2000
MM8-AA	8K X 12 MEMORY, G649 + H219-A, 1.5 μSEC	2875	74%	750
MM8-AB	16K X 12 MEMORY, G649 + H219-B, 1.5 μSEC	3680	74%	950
MM8-EJ	8K X 12 BIT 18 MIL MEMORY, 1.5 μSEC	2050	51%	1000
MRV11-AA	PROM/ROM MEMORY UNIT	210	55%	95
MRV11-BA	PROM MEMORY UNIT	390	55%	175
MS11-JP	16K MOS MEMORY 11/04-34	3450	70%	995
MS8-CB	32K 32 BIT MOS RAM, 4K CHIPS (M8417-BA)	3850	66%	1300
MSV11-DC	16K BY 16 RAM	500	30%	350
MSV11-DD	32K BY 16 RAM	500	15%	425
MS11-FP	8K 18 BIT MOS RAM (M7847-AD)	2250	89%	250
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CMS11-JC	CM11 CONT + DOC TM600 MARK/HOLE SENSE CR, 600 CPM, 120/60	11300	27%	8250
CTS11-JB	SOLD OUT CO SOLD OUT DA SOLD OUT PU SOLD OUT ASCII, 8-BIT HOLLERITH	SOLD OUT	5 SOLD OUT	2500
LP11-VN	SOLD OUT P11 SOLD OUT 0 SOLD OUT SOLD OUT	SOLD OUT	52 SOLD OUT	8000
LP11-YE	LP06-YE + LP11 CONT 120/60	22400	42%	13000
LP11-ZE	SOLD OUT P1 SOLD OUT 60 SOLD OUT SOLD OUT	SOLD OUT	46 SOLD OUT	13000
RP04-H	UNIT SELECT SWITCH KIT	1000	70%	300

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Security Package Guards Against Data Piracy

PALM BEACH GARDENS, Fla. — Applied Software, Inc. has announced the availability of the Data Encryption Facility (DEF), a software package designed to protect computer data from unauthorized access and piracy.

Based upon the National Bureau of Standards' (NBS) Data Encryption Standard (DES) algorithm, DEF is said to provide a totally software-driven encryption capability for IBM and plug-compatible systems running under IBM MVS, SVS or MVT operating systems.

The vendor explained that each user of DEF can code and decode data at the time the data is required, making them solely responsible for its access and use. The encryption key is never stored in the computer system or within the encrypted data itself. In addition to supporting binary and hexadecimal encryption keys, DEF permits encryption keys to be entered as words and phrases up to 255 char. in length.

The NBS DES algorithm mathematically specifies the encrypting and decrypting logic based on the use of a 56-bit key and 8 char. of data. Applied Software provides the NBS testing facility data used for the certification of a DES device. This data and the source program for DES verification is supplied to assure that the software algorithm in DEF has not been altered and that it conforms to the NBS DES standard.

DEF provides batch, interactive (IBM's TSO) and Applied Software's Full-Screen Editor as encryption and decryption interfaces. In addition, assembler language subroutines provide DEF functions to higher level languages such as Cobol, Fortran and PL/I. The software is available for immediate demonstration and installation.

The lease license fee for the first year and first CPU is $16,000. For subsequent years, the fee is $4,000/year. Quantity discounts are available, the vendor said from Suite 204, 4440 PGA Blvd., Palm Beach Gardens, Fla. 33410.

IBM 3232 ASCII

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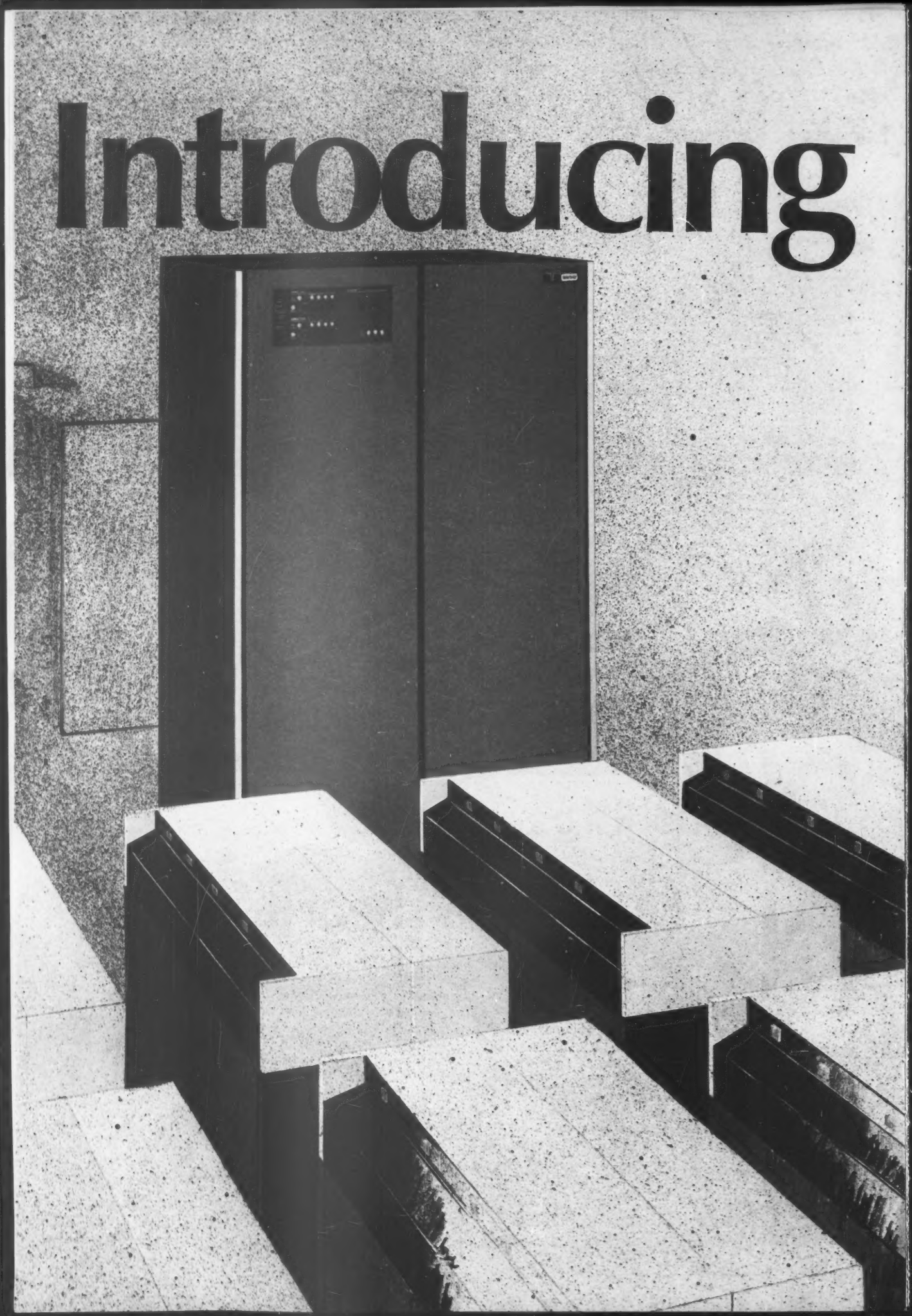


Sybercache

Intelligence and Architecture to Break the I/O Bottleneck

Industry-standard DASD architecture is proving inadequate for many high performance systems. The problem is the growing disparity between processor speed and disk response time.

The resulting bottleneck can throttle performance, inflate operating costs and hinder productivity.

That the bottleneck can be broken has been consistently demonstrated by STC's remarkable stream of DASD innovations.

The latest of these is Sybercache: the STC 8890 Intelligent Disk Controller.

It breaks the I/O bottleneck by eliminating deficiencies in the communications path between CPU and disk storage.

Coupled with STC's current family of 8350, 8650 and 8360 disk drives, Sybercache delivers the I/O response and transfer rates demanded by today's fastest processors.

As STC's new generation 8380 drives come on line, Sybercache will deliver even more performance for still greater productivity.

More Than Cache

By alleviating path queuing problems, eliminating mechanical delay and driving transfers at full channel speeds, Sybercache reduces I/O times by as much as 75%.

Central to its performance is the Sybercache manager--a fast microcomputer that evaluates host channel programs then directs data flow according to the performance needs of each data set. It determines which operations should be directed to disk, which to cache, and how much buffer space each requires--on a case-by-case basis.

Easy Implementation

Sybercache is fully hardware and software compatible with 4341, 370/135-168, 3031-3081, or equivalent CPUs. And since the cache manager handles most tuning needs automatically, implementation is straightforward.

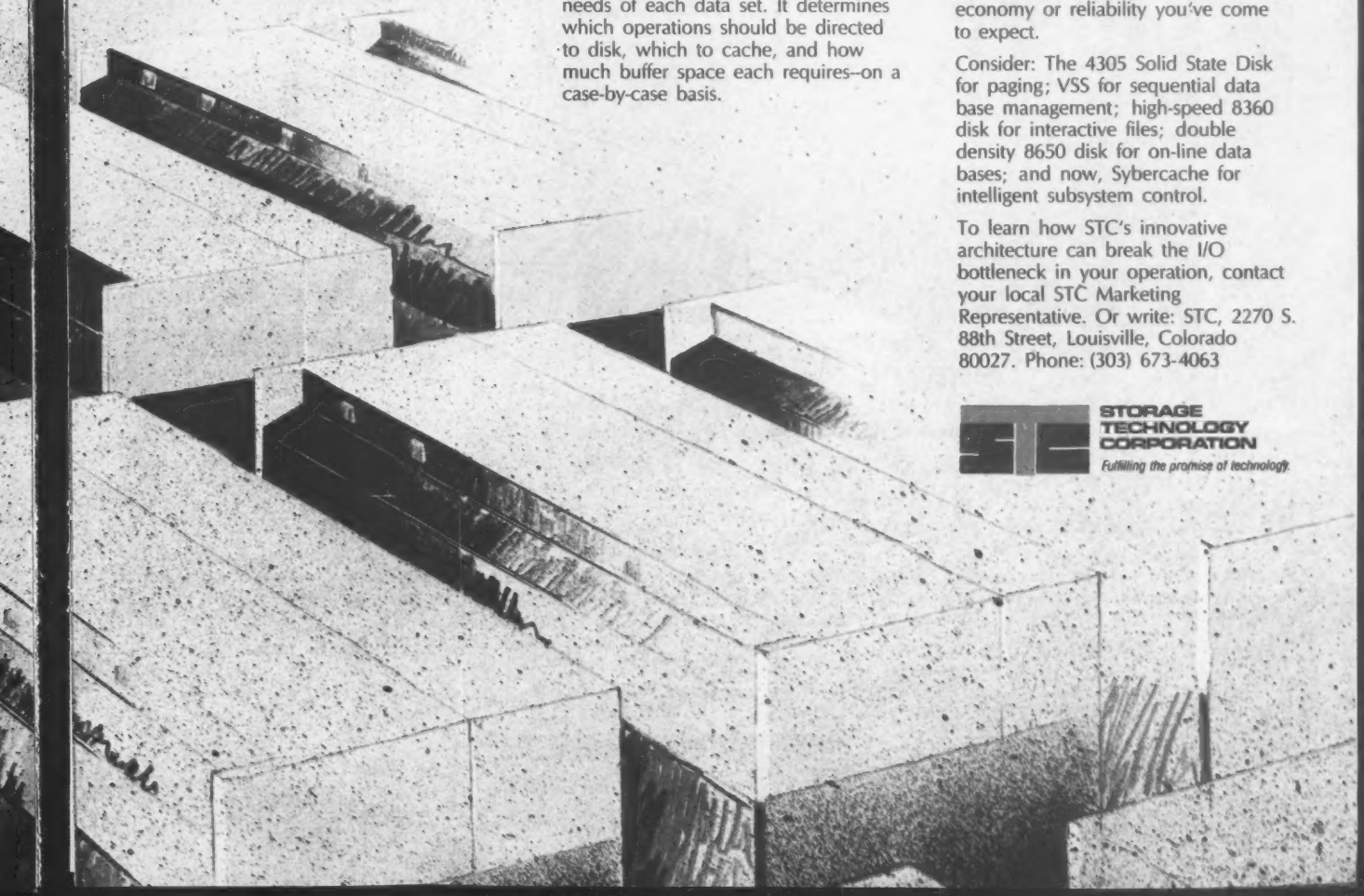
Sybercache comes with 1.5 Mbytes of buffer storage, two storage directors, two-channel switch, and maintenance processor. Field installable options include four-channel switch and 3, 6, or 12 Mbytes of buffer.

Versatile Architecture

Versatility is the principle strength of STC's architecture. Specific products designed to solve specific problems result in consistently high throughput without relinquishing the compatibility, economy or reliability you've come to expect.

Consider: The 4305 Solid State Disk for paging; VSS for sequential data base management; high-speed 8360 disk for interactive files; double density 8650 disk for on-line data bases; and now, Sybercache for intelligent subsystem control.

To learn how STC's innovative architecture can break the I/O bottleneck in your operation, contact your local STC Marketing Representative. Or write: STC, 2270 S. 88th Street, Louisville, Colorado 80027. Phone: (303) 673-4063



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Recovering 'People' Link

(Continued from Page 35)

pine-paneled office dreaming up topics," Webber said.

Gathering people together to talk is the primary mission of Omicron System, which is located in Morris Plains, N.J. These get-togethers, called interchanges, consist of groups of up to 20 individuals who meet for a half-day to focus on a particular topic such as recruitment, the merging of DP and office automation or telecommunications.

Webber reported that those participating in the interchanges, which are closed to outsiders, are not at all shy in disclosing failures and problems their firms are experiencing in MIS. Networking is an added benefit of the group meetings. (See related story on Page 35).

To date, Omicron System has 17 companies participating in its program, among them American Express Co., Pepsico, Avon Products, Inc., Manufacturers Hanover Trust Co., Westinghouse Broadcasting and Cable Co. and Mutual Benefit Life Insurance Co. For an annual fee of $3,500, each company receives two participations in four interchanges, write-ups of the interchanges and can attend the two three-day conferences sponsored by Omicron System. The company can send different people to the various interchanges they select to attend.

Webber said companies are asked to send two people to the interchanges they select to attend, so participants can have moral support when they return to their companies with new ideas. The groups generally meet at the Tarrytown Conference Center in Tarrytown, N.Y.

Still in its formative stages, Omicron System is highly flexible, with all of its interchanges held to date spurring new topics for subsequent meetings. Omicron System plans to hold 40 interchanges a year. The optimal size for the firm as currently structured is 50 organizations with 200 participations. A firm can buy more than one participation. If the idea catches on rapidly, Webber and Rothman plan to open centers in other locations. Most participating companies currently are located in the Northeast.

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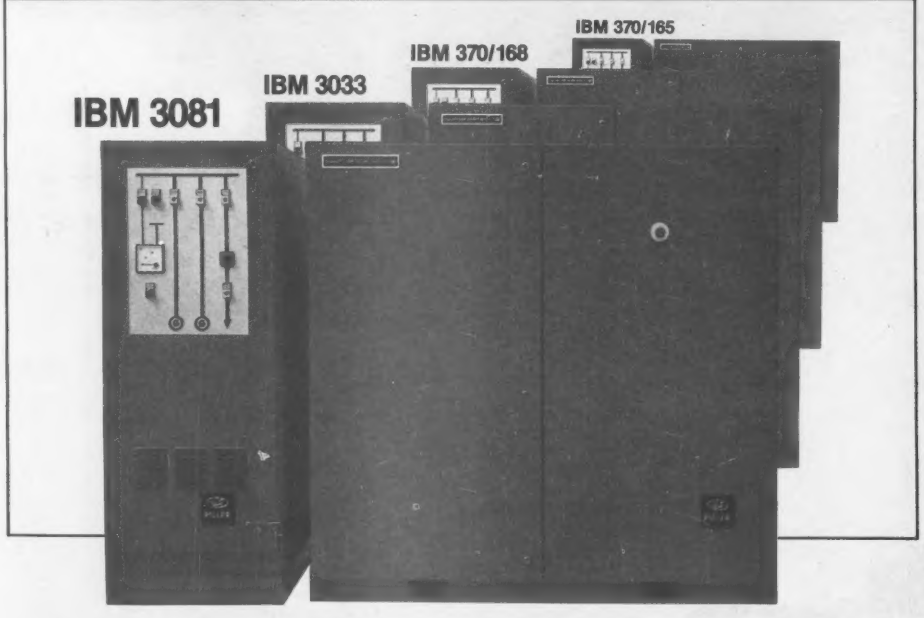

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And as usual, the **PILLER 40 KVA** Frequency Converters offer a number of other exclusive advantages not currently available in other power units...including dual input voltage capability (either 208V or 460V input)...and a special startup system which reduces surge demands to half those of other frequency converters.

*Also meets specifications for **AMDAHL System 580.**

All this at a cost that is competitive with the IBM Model 3089 power unit.

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Idea Exchange Eases Problems

(Continued from Page 35)

harped on defining the job," Gaites explained, "but knowing the culture of your company — the club rules — is also important for determining how an individual will fit into the organization. You may find a great systems analyst, but will he or she fit into the organization if your firm is a large one and that person always worked in a more entrepreneurial environment? The sessions get you thinking and are a way to 'test out' your own ideas," he remarked.

Gaites knew of Howard D. Rothman's executive roundtable group before Rothman started Omicron System a little over a year ago. Since becoming a participant in Omicron, Gaites has attended four interchanges and has sent other individuals to interchanges, including his office automation manager.

It doesn't take a lot to start people talking at these meetings. Sometimes the topics are too broad for the half-day alloted for the discussions, he observed.

Patricia G. Karolchyk, vice-president of international systems and data processing for American Express Co. is another participant in the Omicron System interchanges. Like Gaites, she had known Rothman, the firm's president, prior to committing her company to participate in the program.

American Express is trying to define how better to serve their customers through automation, but at the same time melding automation with the people in the company that have to use the system, she observed.

Multiple Processors Suggested

Exec Calls for Data Server Versatility

By Bruce Hoard
CW Staff

HOUSTON — Data servers for local-area networks should feature distribution of data management functionality, availability, security and performance, Fred Maryanski told National Computer Conference attendees at a session here recently.

A data server cannot be created by simply placing the data management software in a dedicated processor, the consulting engineer with Digital Equipment Corp. said, adding that the software must be partitioned between the local network workstation and the data server.

As with a traditional back-end data base, additional communications software must be added to a data server configuration in order to tie the pieces of the data management system together, he said.

It is not unusual to hear would-be local-area network users say that they insist on reliability if they are going to put all their data on a data server, Maryanski said. The first design decision with respect to high availability data servers relates to redundancy. Additional reliability can be gained through the use of multiple processors, Maryanksi noted.

"In any reasonable data base facility, backup copies of the data are maintained," he said. "In terms of a data server, the issue to be addressed is whether the backup copies should reside on the same processor as the current data or be located on another processor."

Maryanski went on to say that the basic philosophy of local-area networking argues for multiple processors. Although multiple processors add cost, that is compensated by increased reliability, the declining cost of processors and the potential for high bandwidth communication. The issues of security in a local-area network's data server are akin to those in a back-end data base system, the engineer declared. The question he posed in relation to that was, "Does a network data server provide more security than a data manager on a single, multipurpose processor?" The key factors involved in that evaluation are isolation and authorization.

In many data managers that are constructed upon a standard file system, it is possible to access the data files directly through the operating system without knowledge of the data manager, he said. Both the back-end data base and data server configurations eliminate this problem by isolating the data from all application programs. However, data isolation provided by the data server can only be useful for security if the problem of authorization is resolved.

He suggested a scheme whereby designated uses may grant and revoke access to portions of the data base by issuing special commands. An authorization mechanism of this type can be adapted to the data server environment with little alteration.

Turning to the issue of performance Maryanski posed two further questions:

- How does the performance of a data server on a local-area network compare with a single mainframe running both the data manager and applications?
- Which data server configuration gives the best performance for a particular environment?

The proper determination of the performance tradeoffs of a single mainframe system vs. a local-area network requires a detailed analysis, and he suggested simulation as the best approach to evaluate a particular application environment.

Maryanski recommended queueing model analysis for determining which data server configuration gives the best performance.

Controller/Display Station

Telex Announces Stand-Alone 3270

TULSA, Okla. — A stand-alone or small cluster environment 3270 controller/display station has been announced by Telex Computer Products, Inc.

The Telex 476 terminal offers remote locations needing single or a minimum number of devices — an alternative to multiple device controllers, the vendor said.

This product features a 15 in. diagonal screen with a 1,920 character display.

It reportedly supports all Telex keyboards in the 278 display series.

Two 476 models will be available: The 476B features binary synchronous communications protocol and utilizes reverse video and blinking. The Telex 476S operates using Systems Network Architecture/Synchronous Data Link Control communications protocol. Both models cost $3,700 and will be ready for shipment in August, according to the vendor at 6422 E. 41st St., Tulsa, Okla. 74135.

Banks Get Olivetti DDP Terminals

DALLAS — A distributed data processing terminal system developed by Olivetti Corp. for the banking industry has been announced by Docutel Corp.

Line 1 includes modular teller operated terminals, as well as document processors, administrative workstations, identification systems, data storage devices and two controller modules.

A major attraction of the system is said to be its controller capability, which permits a range of functions to be performed simultaneously, and accommodates a range of high-level software compilers.

The average workstation cost is between $5,500 and $7,000. Docutel can be reached through P.O. Box 222306, Dallas, Texas 75222.

Unit Boasts Redefineability

MINNEAPOLIS — The Teleray Division of Research, Inc. has unveiled a CRT terminal offering user-defineable features.

The Model 16 multipage terminal reportedly features redefineable logical line and page lengths, 32 redefineable keys, four pages of volatile or non-volatile display memory (expandable to eight pages) and the capability of using extra display memory as programmable function memory.

The Model 16 multipage terminal costs $1,545. Teleray can be reached through Box 24064, Minneapolis, Minn. 55424.

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CRT Terminal Series Aimed at System Designers

MARKHAM, Ont. — Northern Technologies Ltd. has introduced a series of CRT terminals aimed at system designers.

Vision terminals are said to make use of the customizable, multiprocessor Freedom architecture that allows changes in protocols, data handling and CRT terminal functions to be programmed in high-level language without reengineering.

Standard features include a 15-in. or 12-in. video screen in amber, green or black on white, 24 line by 80- or 132-col display with 25th status line and up to four pages of screen memory. The terminals include up to 48K bytes of combined random-access memory/read-only memory and 256 2K bytes of non-volatile E^2 Prom.

The Vision Series Model 2000, comprising an enhanced Digital Equipment Corp. VT-100, costs $1,500, and high-level, synchronous, multiprotocol customized units begin at $2,000, a spokesman said from 85 Torbay Road, Markham, Ont., Canada L3R 1H1.

CRT Terminals Emulate DEC VT-100, IBM 3101

ARMONK, N.Y. — Tandberg Data, Inc. has announced a line of intelligent CRT terminals called the TDV 2200 series.

The terminals are offered in models that emulate virtually any terminal, including the Digital Equipment Corp. VT-100 and the IBM 3101. Features include ergonomic design characteristics that reportedly minimize operator stress and fatigue.

Intensity controls are available for both the text and background light to provide optimum contrast under varying lighting conditions, the vendor said.

Terminals cost from $2,300 the vendor said from the firm located at P.O. Box 99 Labriola Court, Armonk, N.Y. 10504.

CRT Unit Boasts Screen Editing

ANAHEIM, Calif. — Soroc Technology, Inc. has introduced an intelligent CRT terminal with 180-degree left-to-right swivel and 15-degree upward or downward tilt. A detached keyboard with palm rest is also featured.

The New Range terminal also features screen editing capabilities, 14 programmable function keys, 25th status line with a 36-char. user message, block and conversational modes, printer and auxiliary RS-232 ports and transmission rates from 110 to 19K bit/sec.

Line graphics functions are included, according to the vendor.

The terminal is available for $845 from Soroc Technology, 165 Freedom Way, Anaheim, Calif. 92801.

Data Protector Reduces Errors

CHERRY HILL, N.J. — Datatel, Inc. has introduced a data protector for use with asynchronous terminals on dedicated high-speed facilities. It is said to eliminate data transmission errors while converting the terminal's asynchronous data to the synchronous format necessary for use on higher speed synchronous facilities.

The DCP4020 Async/Sync Data Protector is installed at each end of a data link between the modem and the terminal or computer port. They may then be used with any dedicated full-duplex synchronous modem at speeds of up to 9,600 bit/sec, the vendor said.

Prices range from $600 to $750. More information is available from Datatel, 1008 Astoria Blvd., Cherry Hill, N.J. 08034.

Controller Offered For IBM's Micro

CYPRESS, Calif. — Persyst, Inc. has announced a dual-channel asynchronous communications controller designed for IBM's Personal Computer.

Available in both single- and dual-channel models, the controller boards feature a rotating jumper plug that eases communications cabling by switching the transmit/receive signals in the connector, at programmable transmission rates selectable from 50- to 19.2K bit/sec, the vendor said.

The dual-channel option reportedly allows more efficient use of limited processor space in applications.

The single-board controllers support 5-, 6-, 7-, or 8-bit characters with 1-, 1.5- or 2 stop bits.

Single-channel cards cost $130 and the dual-channel cards cost $195, the vendor said from 22957 La Cadena, Laguna Hills, Calif. 92653.

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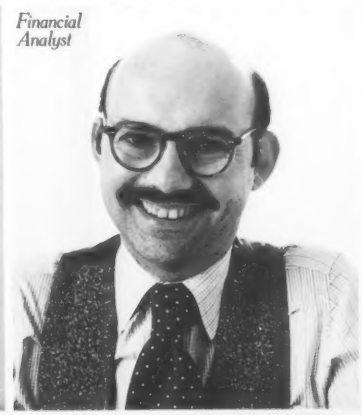

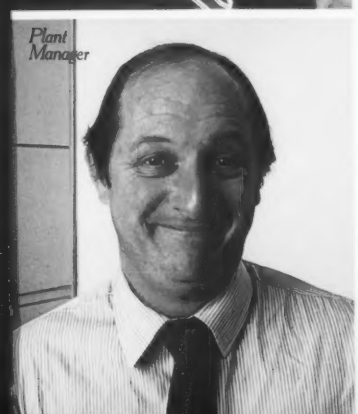

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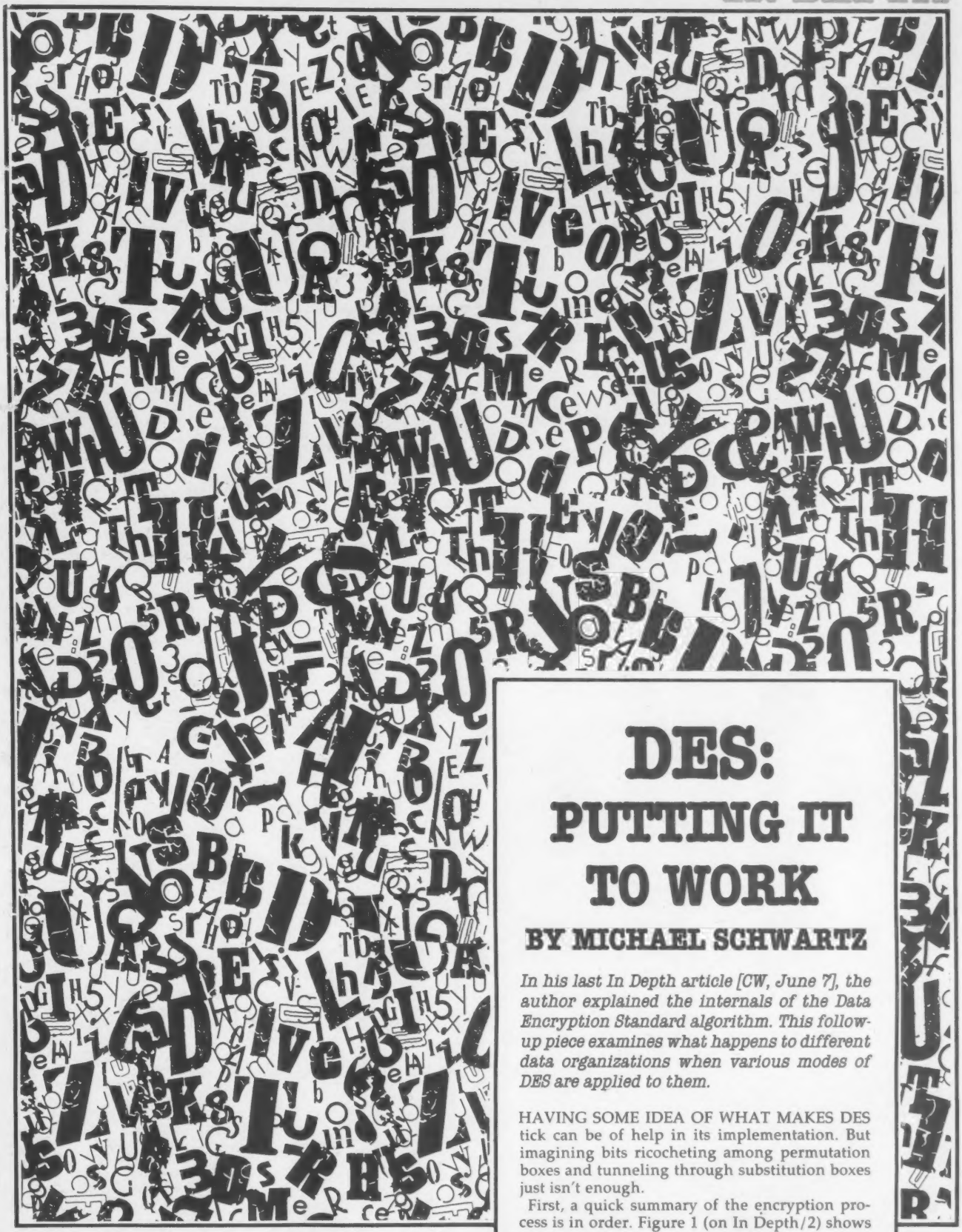


DES: PUTTING IT TO WORK

BY MICHAEL SCHWARTZ

In his last In Depth article [CW, June 7], the author explained the internals of the Data Encryption Standard algorithm. This follow-up piece examines what happens to different data organizations when various modes of DES are applied to them.

HAVING SOME IDEA OF WHAT MAKES DES tick can be of help in its implementation. But imagining bits ricocheting among permutation boxes and tunneling through substitution boxes just isn't enough.

First, a quick summary of the encryption process is in order. Figure 1 (on In Depth/2) shows the basic DES algorithm. To encrypt data, a 64-bit data segment (called *cleartext*) enters the algorithm. These 64 bits are tossed, tumbled and integrally mixed up with a 64-bit key (of which only 56 bits are active in the algorithm). Out of the system comes 64 bits of *ciphertext*. To decrypt

IN DEPTH

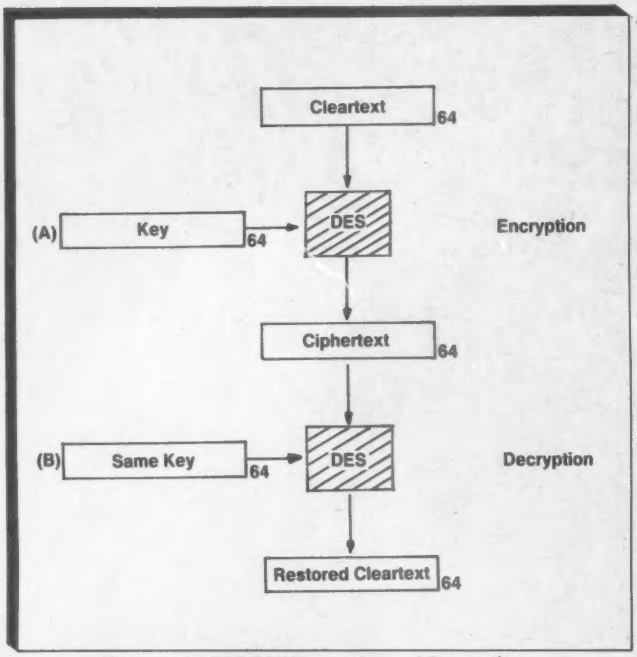


Figure 1. An ECB DES Encryption and Decryption

```
00000000111111112222222200000000
Prime Factors:  DES Specialists.
Prime Factors:  DES Consultants.
```

Figure 2a. "CLTXT" Sample Data (Ascii Characters)

				Block No.
00000000	11111111	22222222	00000000	1 → 4
Prime Fa	ctors:	DES Spec	ialists.	5 → 8
Prime Fa	ctors:	DES Cons	ultants.	9 → 12

Figure 2b. "CLTXT" Sample Data in 64-Bit Blocks

the ciphertext, the 64 bits are fed into the same DES (under control of the same key), and the restored cleartext is the result.

The salient feature: *A "block" size of 64 bits is required.* This limitation is a specter that finds its way into every aspect of DES applications.

Figure 2a shows the data that is to be the cleartext example referenced throughout this article. I will refer to it as CLTXT. Figure 2b shows CLTXT split up into 12 blocks, each 8 characters long. To facilitate referencing CLTXT and its various encryptions, the blocks will be numbered as shown in Figure 2b. Block No. 1 is in the upper left. Blocks are consecutively numbered from left to right until the last, lower right, is No. 12.

CLTXT is made up of printable 8-bit Ascii characters. Since DES produces ciphertext comprised of blocks of random bit patterns, the various encrypted forms of CLTXT presented here always contain some 8-bit patterns that are *not* members of the Ascii character set. In order to keep block structure visible when displaying encrypted forms of CLTXT, the character period (".") is substituted for all unprintable characters.

CLTXT has been arranged to accommodate the DES block length. As a data stream, the total number of bits is 96 bytes multiplied by 8 bits per byte, or 768 bits. And 768 bits divided by 64 bits (per DES block) equals 12 blocks. Similarly, each file record contains 32 bytes or 256 bits; that is, there are four DES blocks per record. For the present, we will bow to the 64-bit block DES requirement. Later we will take a look at DES use on streams or records whose lengths are not multiples of 64 bits.

CLTXT can be viewed as two types of data organizations:

1. A communicated bit stream.
2. A file containing three records.

Correction

In "Making Sense of DES" [CW In Depth, June 7], the exclusive OR (XOR) function was defined as an operation that yields 1 if the operands are the same and 0 if the operands are different. Rather, the result is 0 if the operands are the same and 1 if they are different. The conclusions of the article are unaffected.

The communicated stream is a string of 96 characters to be transmitted over insecure data lines. Single communications are almost always controlled by a single key, and the chosen mode of DES remains the same for all data in the transmission.

Data files, on the other hand, may be viewed as containing logical records (CLTXT has three) *or* as a single data stream. When protecting files, it is often the intention to leave the encrypted file on disk and have the capability of randomly accessing any record and decrypting it independently of all other records. Under other circumstances, the file may be treated as a long data stream.

The difference between these two approaches is straightforward. When encrypting by record, you must treat each record as if it were a separate data stream. This means that any "initialization" procedure required by a DES mode must be restarted. This won't make much sense now, but when the Cipher Block Chaining and Output Feedback modes of DES are employed, the differences in record- vs. stream-oriented ciphertext are profound.

Modes of DES

Once upon a time, if encryption was used at all, it was applied to communicated data only. Now there is an extensive need to protect data on disk and in tape files. This requires more elaborate ways of using DES.

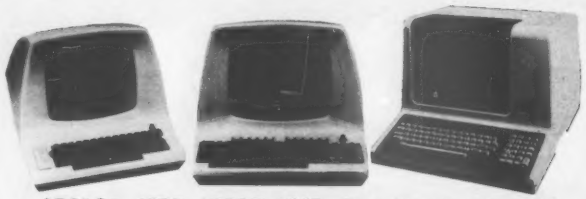
These "modes of operation" have become specific to particular application areas and production needs, and they will be the focus of this article.

We will take a look at the following modes of DES encryption: Electronic Code Book (ECB), Cipher Block Chaining (CBC) and Output Feedback (OFB). We will also briefly examine a method for verifying the origin and validity of data using DES (MAC generation) without actually encrypting.

ECB Mode

The most basic implementation of DES is in its Electronic Code Book mode. This is the "native," no-frills application of DES as shown in Figure 1. When it is used to stream-encrypt CLTXT, the result is as shown in Figure 3 (on In Depth/4).

ECB encryption is a simple procedure of serially stepping through each 8-byte (64-bit) block until the



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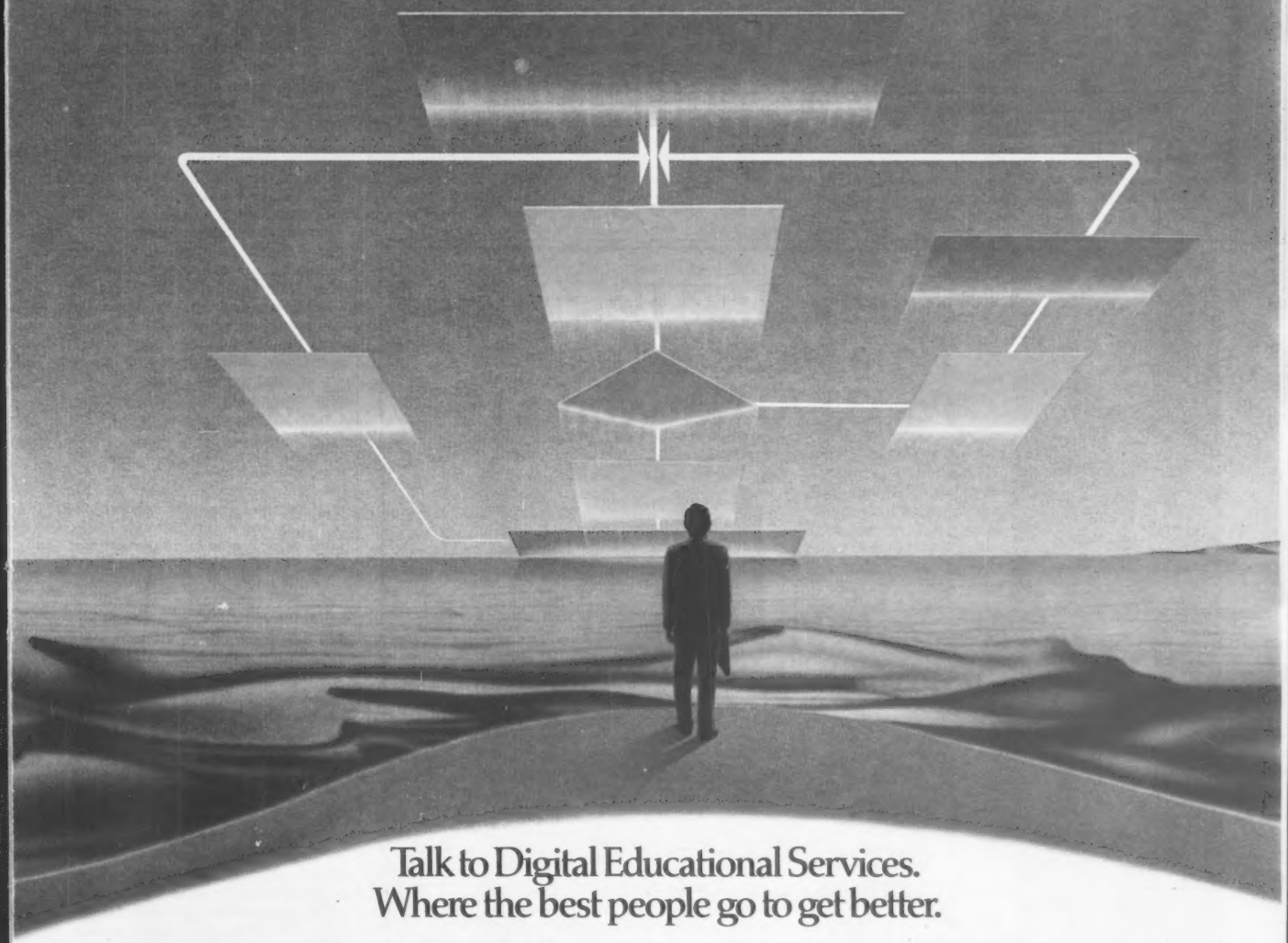

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```
.0.m<.W.    ..?d....    ?.E.fEWf    .0.m<.W.
_.s$42[.    .(K.5h].    $...}rd.    z.$.y.$.
_.s$42[.    .(K.5h].    i$n.*.^Q    7..69c-.
```

Figure 3. Stream- and Record-Oriented ECB Encryption

last block is encrypted.

We immediately notice one thing about the ciphertext in Figure 3: Identical cleartext blocks encrypt into identical ciphertext blocks. Blocks 1 and 4 in CLTXT are the same. In addition, block 5 is the same as 9, and 6 is the same as 10. Figure 3 shows that the same is true for the ciphertext.

This has interesting ramifications. While the power of DES encryption still protects the contents of individual blocks, certain information in ECB ciphertext gives an idea of the organization of the cleartext. This is potentially valuable information to the unscrupulous interloper (the evil genius after your information).

For example, source languages (Cobol, BAL and so on) are often written in a highly structured format. And most files, including sensitive ones like payroll and accounts receivable, are organized by fields within file records. These structures make processing these files more efficient, but often contain gaps, usually blank-filled, between and within fields. If someone has broken into your system with data vandalism on the brain (*not* organized data alteration; this still is not possible), such repetitions of ciphertext blocks might help him find the file he wants. Data compression prior to ECB encryption can help alleviate this problem.

ECB mode requires data with a length that is a multiple of 64 bits. This is not a problem when stream-encrypting for communications. The potentially incomplete (less than 64 bits) last block may be padded with null (0) or randomly set bits. The receiver simply chops these off after decryption according to a flag and bit count within or appended to the message.

But when working with magnetic tape and disk files, there can be a problem. First, the ciphertext file may have to be exactly the same size as the cleartext file. Second, in the same vein, it may be important that each record in the ciphertext file be the same length as each cleartext record. This is essential when a file remains encrypted while disk-resident and user programs (written to reach the *cleartext* records) simultaneously and randomly access and decrypt single file records.

The record-oriented ECB encryption of CLTXT yields the same results as the stream approach. Considering the simplicity of ECB design, it should not be difficult to see that this must be the case.

Error Propagation

The ramifications of changes, be they communications glitches or disk errors, are important when storing or communicating ciphertext. Because of DES's complicated bit scrambling on a block basis, if a single bit of ECB-encrypted ciphertext is changed, the 64-bit block to which that bit belongs will decrypt badly and have absolutely no resemblance to the original cleartext. If we change a single bit in block 1 of the ciphertext in Figure 3, the block shows a single character change:

Before: .0.m<.W. After: .1.m<.W.

When this altered block is decrypted, the resulting cleartext has no resemblance to the true cleartext:

Before: 00000000 After: z.n. . .F.

This effect is both bad and good, depending on your perspective. It's bad if a single flipped bit in a file causes the loss of up to 8 bytes of information.

But it's generally smiled upon by communications people because a single bit error propagates and is magnified up to 64 times. This amplification of communications errors helps overcome some of the inadequacies of parity checks.

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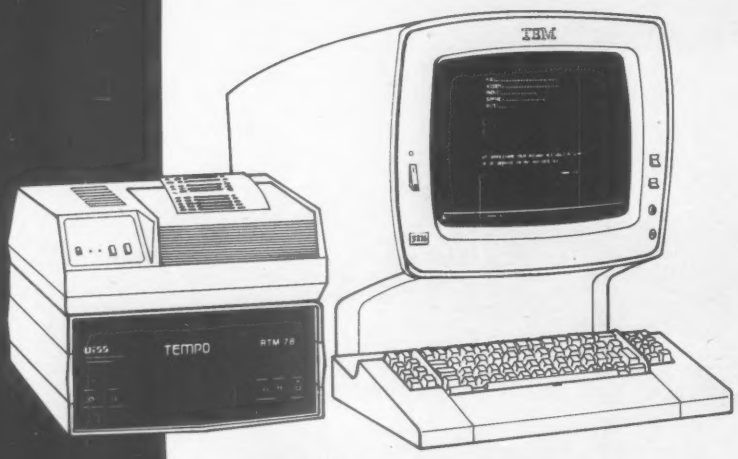

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TEN INVENTIONS THAT SHOOK THE WORLD

1. circa 17,000 B.C. Fire. Invented by Thomas Alva Og, a gentleman ruminating poetically with a piece of dry straw between his teeth one prehistoric dawn. A falling rock chanced to strike him upon the noggin, causing his upper teeth (which were false, made of flint) to clash against his lowers (also false – of iron). A spark occurred. Mr. Og's straw took flame. Fire was born. Before the process was otherwise packaged, T. A. Og took many another bash on the bean, with a straw between his teeth. But being a man of good nature, he reflected that since all was in the interest of science it was well worth it.

2. 1968. Cullinane was the first company to specialize in computer software products exclusively. (A venture most fruitful – Cullinane is the most financially successful software company in the nation, with an unparalleled record of customer approval, vendor support, systems enhancement and new products development.)

3. 1492. The Wheel. Actually invented by Columbus – the round wheel, that is. Prior to 1492 all wheels were flat; and all pictures showing round wheels previous to that date have, in fact, been doctored. In truth, Columbus not only discovered the round world and the round wheel; he invented the whole concept of circularity. (Got the idea from King Ferdinand, who was well-rounded; and Queen Isabella, who was significantly circular of girth.)

4. 1975. Cullinane introduced the first active, dictionary-driven database management system – a centralized resource for 'data about data'; providing control of all corporate resources, both database and conventional files. (Our new IDMS-1982 is the most flexible, powerful and complete management system on the market.)

5. 1784. The Tin Can. Though a commoner, Timothy Eggers had risen to high position with one of England's most eminent merchant princes: Sir Haggard Bagley. Timothy's main job was the firing of those among Sir Haggard's employees who fell into disfavor. It was his wont to assign the order of disintermediation by tossing dice about in a container of gold, studded with diamonds. It soon chanced that the infamous, decisive container was awarded the very nickname of its owner: 'Tim, The Can.' When food containers of baser metals devolved from Tim's concept, they were called *'Tin* Cans,' so as not to infringe on Eggers' copyright.

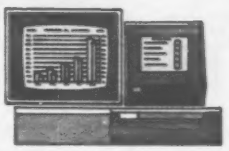
6. 1978. Cullinane was the first computer software company in ten years to make a public offering. Our performance in terms of growth and earnings has been consistently high. (Cullinane is traded on the NYSE under the symbol CUL.)

7. 1822. The Belt. John Doe, a Chicago fireman, became discouraged with his red suspenders. His pants kept falling down, despite them. One day he decided to cut out a piece of leather, punch some small holes in one end, put a buckle at the other end, and pass the entire contraption through the belt loops of his trousers. While passing the leather through the belt loops, he espied the buttons his red suspenders ought to have been attached to. *"That's* what those are for!" he exclaimed. (The name 'Belt,' by the way, came from the loops through which Doe's original was directed.)

8. 1980. Cullinane was the first database management system vendor to make a major commitment to *specific* applications – with the likes of CIMS (our comprehensive manufacturing system; including eight easily tailored, fully integrated subsystems); CFS/GL (our general ledger system, the nucleus of the Cullinane Financial System; to include accounts receivable, accounts payable and fixed assets systems); and CIS (our online system for banks; providing online access to all customer-related information, with detailed account cross-references).

9. 1888. The Peanut Butter & Jelly Sandwich. A most unseemly originator. Rajah, by name. A circus elephant, who one day was left in great proximity to the peanut vendor's source of supply. Driven mad with the thought of all those lovable legumes, Rajah mashed about them with his giant feet. The result was that exotic aroma we now associate with peanut butter. Suddenly, an idea occurred to Rajah's owner, one George Jelly – who also happened to own a bakery. The idea stuck to the roof of Jelly's mind, and ultimately became the beloved P B & J.

10. 1982. The Cullinane Graphics Information System. The dawning of a new era in information analysis for the CEO.



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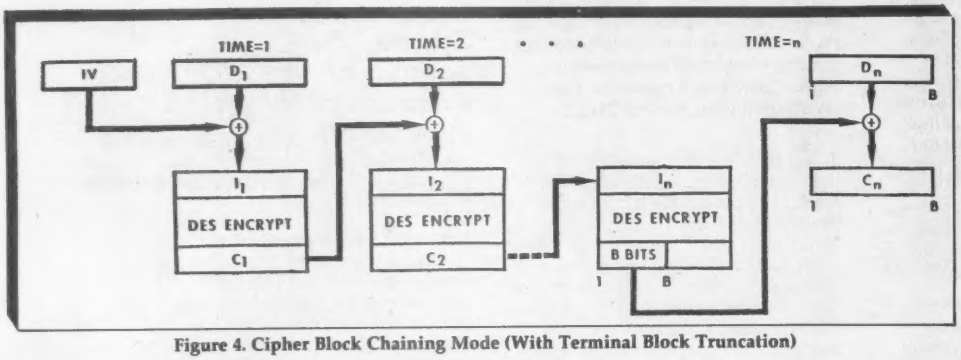

Figure 4. Cipher Block Chaining Mode (With Terminal Block Truncation)

```
.yP...#=   qso.4.u6   {.D.k.X.   {.u.T.9.
i..5}...   cB".+JS.   %K9mt.#.   Q..j.!6.
=<M.c.E.   zf}.(..,   hLS...TO   .l..z#e.
```

Figure 5a. A CBC Stream Encryption of CLTXT

```
.yP...#=   qso.4.u6   {.D.k.X.   {.u.T.9.
J.D.C.=.   {oK.<.k{   ...Um.3.   d.98P:!.
J.D.C.=.   {oK.<.k{   T."...h.   !.R..e\/
```

Figure 5b. A CBC Record Encryption of CLTXT

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is really lost. The communication may be reencrypted, then restarted. Or, if software allows it, the single erroneous block may be retransmitted. This is one of the niceties of ECB mode. The independence of the encryption of blocks means that a full retransmission is rarely necessary.

ECB Mode Security

The security of DES in general is something of a controversial area that I will not discuss too deeply at this point (see last section of this article). All that can be said is that to date there is no published algorithm that works on ciphertext and gives the key used to generate it.

But something can be said about the relative security of the various modes of DES. It is generally accepted that ECB mode is the least secure of all the modes, in part because the repetition of identical ciphertext blocks from identical cleartext blocks has the potential drawbacks mentioned above.

CBC Mode

Cipher Block Chaining mode works as shown in Figure 4. When performing a DES encryption on a block of cleartext, the ciphertext from the previous ECB output is exclusive-ORed (XORed) with this cleartext before it enters DES (this operation is designated by the circled plus sign; see "Making Sense of DES" [CW, June 7] for a concise definition of the exclusive OR).

Take a look at the section in Figure 4 marked "TIME=2." The rectangle marked D_2 is a 64-bit cleartext block. Before D_2 enters DES, it is XORed with C_1, the output from the previous DES encryption. The result of this XOR enters DES. This process continues as long as there are cleartext blocks to encrypt. Don't pay any attention to what happens to C_2; we'll get to this later.

The salient features of CBC mode are:

1. It is only an elaboration of ECB mode. ECB mode is at the heart of all the modes of DES.

2. The independence of the encryption of individual blocks is destroyed. The encryption of each block depends on the encryption of the previous block.

Figure 5a is a CBC encryption treating CLTXT as a stream. Figure 5b is an encryption on a record-by-record basis. Before we look at why these two differ, let's compare CBC ciphertext with that of ECB.

First, compare Figure 5a (stream) with the ECB encryption (Figure 3). Immediately we see that the ciphertexts differ. They should. When using CBC mode, we have made the encryption of each block indirectly (through XOR with the previous ciphertext) *data dependent*. In ECB mode, the ciphertext output from any encryption depended only on the cleartext block and the key. In CBC it depends on an additional factor: the ciphertext from the previous block.

So, Figure 5a significantly differs from Figure 3 in one major aspect: The same cleartext blocks *do not* encrypt into the same ciphertext blocks.

Second, while record- and stream-oriented ECB are the same, this is not the case for CBC. But 5b, record-oriented CBC, shows that there *are* repetitious ciphertext blocks: 5 equals 9 and 6 equals 10. But this is one less repetition than was seen in ECB; block 4 is *not* equal to block 1 as in ECB. Why? The answer lies in the leftmost part of Figure 4.

CBC must be "initialized." This is shown as the rectangle marked IV (for initialization vector) entering from the left. IV is the initial 64-bit block required to chain into the first data block. This can be any value chosen prior to CBC encryption. Figure 5a differs from 5b because in 5a a single IV is used to initiate the encryption of the entire stream, but on a record-by-record basis IV is used anew at the beginning of each record. So, what happens when the first blocks are the same in different records? If they use the same IV and have the same cleartext blocks, they will have the same ciphertext.

The net result is that it is possible to have an ECB-type matching of clear and ciphertext blocks under limited circumstances: If the first N *consecutive* cleartext blocks of any two records (to be CBC record-by-record encrypted) are the same, the first N ciphertext blocks will also be the same. This too presents an exposure as with ECB, but a much lesser one.

CBC Error Propagation

Because each CBC-encrypted block is a function of the previous encrypted block, it should not be surprising that a bit error in ciphertext affects more than one block during decryption. Let's alter the last bit in block 11 in Figure 5a and see what happens to it and the following block on decrypting:

Ciphertext alteration:
hLS . . . TO to hLS . . . TP

Before this bit change (O is Ascii decimal 79, P has a value of 80 — a 5-bit difference), we expected a decryption of "DES Consultants." Instead we get:

e-h.(. . . ultants!

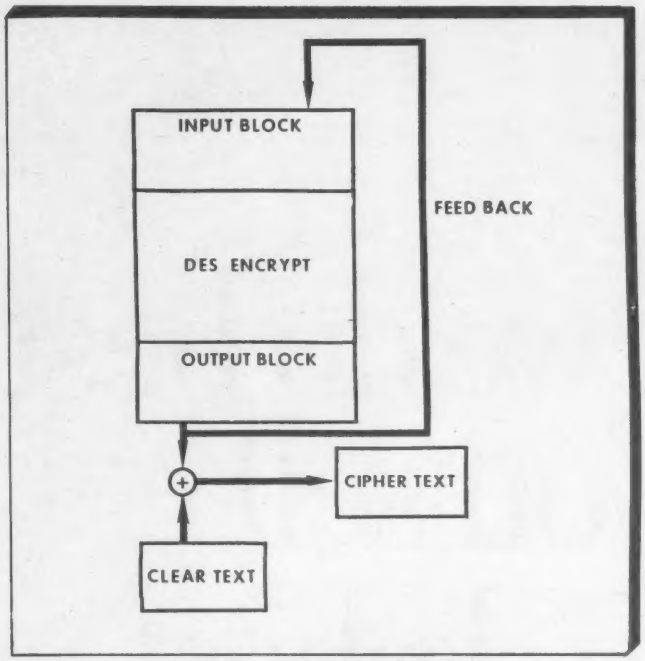

Figure 6. Output Feedback Mode

Now a bit error affects two blocks. The cleartext from the *altered* block is completely incomprehensible as with an ECB error. But because this bad ciphertext block will be XORed with the next block of *cleartext* during decryption, there can only be as many bit errors in the following decrypted block as existed in the ciphertext. This is demonstrated when we obtained "ultantsl"; which differs from "ultants." by 5 bits.

As with ECB mode, this error propagation may be welcomed in communications, but is somewhat more inconvenient to those maintaining encrypted magnetic files. Depending on the amount of destruction to a ciphertext block, it is possible to lose up to 128 bits of cleartext data.

CBC Mode Security

CBC mode is considered to be more secure than ECB for two related reasons:

1. Ciphertext has greater data dependency. ECB accepts pure cleartext as input; CBC accepts this in combination with ciphertext from the last encryption. This complicates the attempted cryptanalysis of any given ciphertext blocks.

2. The problem of identical ciphertext blocks resulting from identical cleartext is all but eliminated.

Point No. 2 is a natural consequence of No. 1.

In addition, there is a new value, the IV, that is in a very loose sense an additional key. CBC data encrypted with the same key, but using different initialization vectors, produces different ciphertext. Since IV may be any 64-bit value, there are 2^{64} ways to initialize the system.

Perhaps some readers are wondering how to increase the security of CBC mode when applied in the record-by-record fashion. Is there a way to eliminate completely the possible ECB-like redundancies from the beginning of records? The answer is called "CBC record chaining."

The concept is simple. Do not use the new IV at the beginning of each record. Instead, use the ciphertext from the last block of the last record as the IV for the new record. At first glance this seems to be the same thing as treating the data file like a stream (Figure 5a). It is the same only if each record has a length that is a nice multiple of 64 bits.

How has record chaining affected the ability to access and decrypt file records independently? We have lost it. In order to decrypt any record other than the first, it is necessary to access the previous record in order to get the last 8 bytes of ciphertext which act as the IV for the decryption. This may be a heavy price to pay (in computing dollars) to avoid possible redundant blocks of ciphertext.

OFB Mode

Output Feedback (OFB) mode is something of an oddball, but an extremely useful implementation of DES. Figure 6 shows how it works. An arbitrary 64-bit IV is input to DES (this is not shown in Figure 6). This produces an output block that is dependent only on the key and IV. This output block is XORed against 64 bits of cleartext to produce *true* ciphertext. The next output block is produced by feeding back the previous one into DES. This result is again XORed against cleartext to produce ciphertext.

```
3.kQR.fa   [.t.l...   U.f.(].w   A..oB7.F
ƒ.s...>e   1tK.f{.L   RR@KbÍrk   )2b...<.
x5..d"?[   D..2..FE   f...D.tv   I.x.9>}.
```

Figure 7a. An OFB Stream Encryption of CLTXT

```
3.kQR.fa   [.t.l...   U.f.(].w   A..oB7.F
S.2....2   ..*.....   $...I.H(   ..._6.sQ\
S.2....2   ..*.....   $...Y.C8   ..G>.sQ\
```

Figure 7b. An OFB Record Encryption of CLTXT

Let's see what OFB does to CLTXT in stream-oriented ciphertext (Figure 7a) and record-oriented (7b). Stream-oriented ciphertext, while different from CBC, has the same primary quality: similar cleartext blocks do *not* encrypt into similar ciphertext blocks. This is because the DES stream is initiated only once.

But record-oriented OFB reveals an interesting effect. Not only do identical cleartext blocks produce identical ciphertext blocks, but *identical cleartext characters produce identical ciphertext characters.* Take a look at ciphertext blocks 7-8 and 11-12 in Figure 7b. In 7 and 11, the cleartext characters "DES" encrypt into "# . . ." Similarly, in blocks 8 and 12, "ts." always encrypts into "sQ\."

This is something quite new. It is the direct result of the oddball character of OFB: When encrypting, the true cleartext never enters the DES algorithm. DES is being used as a random number generator. The output of this generator of 64-bit numbers is merely XORed against the cleartext to produce ciphertext. The XOR is a bit-wise function, so when the same OFB "stream" is XORed against two consecutive cleartext blocks that have only a single bit difference, the resulting ciphertext blocks will differ only by a single bit.

So, in a sense we have given up DES's ability to scramble up all 64 bits of an input block. This is good and bad. The good is really good and the bad can be really bad.

OFB Error Propagation

As we did with the other modes, let's see what happens when we change a ciphertext bit and decrypt. When block 4 (Figure 7a or 7b) is changed by 1 bit from "A..oB7.F" to "A..oB7.G" the new cleartext changes from "00000000" to "00000001"— a single bit change. *There is no error propagation.*

This is good news for those encrypting magnetic data files and (probably) bad to the communications expert. The data file now loses only a single bit for each altered ciphertext bit.

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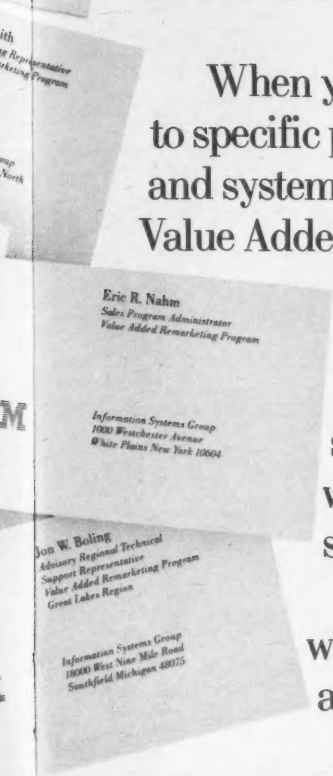

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this can affect security.

Error propagation can do more than help warn of communications glitches. It can be a danger signal that someone is altering your data. If this is the case, OFB can hit you twice below the belt. First, the lack of error propagation means that it is possible to change ciphertext without affecting parity or quantity of bits. Second (and this one can really hurt), OFB-encrypted data can be subjected to frequency analysis.

The frequencies of the various letters in all alphabetic languages are well known. This makes frequency analysis one of the major tools of the cryptanalyst. Let's suppose that you maintain OFB record-oriented encrypted Ascii or Ebcdic text files and are reinitiating each record using the same key and IV (you would want to do this to be able to access randomly and independently decrypt file records).

And suppose our evil genius has broken access control and is soaking up file records using his home computer. All he need do is run a simple program over the captured records and start ranking occurrences of 8-bit patterns. Before you can say "Output Feedback Mode," he has deciphered your "unbreakable" cipher. And he didn't even need the DES key!

To complete this unfortunate scenario, he can now also alter data at will. Consider what this could do to a happily humming payroll system.

This problem may be avoided by not using record-oriented OFB to protect files or, more likely, using a different IV/key combination for each record. This could be the last 128 ciphertext bits of the last record.

Communications people, beware. The above bad dream could happen to your electronic funds transfers if you reinitiate each transfer with the same IV/key combination.

One OFB Solution

Believe it or not, even after the above-described nightmare, OFB is the answer to dealing with data segments that are not a multiple of 64 bits.

Consider the independent encryption of a 228-byte record. And let's use CBC mode. First, 228 divided by 8 equals 28 8-byte blocks with 4 bytes left over. We know how to take care of the first 28 blocks. What about the remaining 4 bytes? These are OFB-encrypted.

The process is shown back in Figure 4 (on In Depth/6). Take a look at what happens after the encryption at TIME=2. The ciphertext from the last encryption (C_2) becomes the IV (marked I_n) to OFB. This is encrypted and the first "B" bits of the output block are XORed against the remaining B bits (32 in this case) of cleartext. Thus we get a true ciphertext of B bits in length.

This procedure is relatively safe compared with the possible pitfalls of record-by-record use of OFB for two reasons:

1. The data segments subjected to OFB are always less than 64 bits long. This minimizes the amount of OFB-en-

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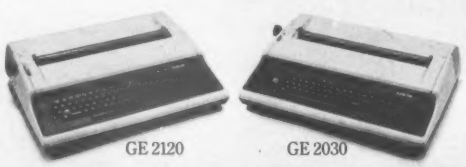

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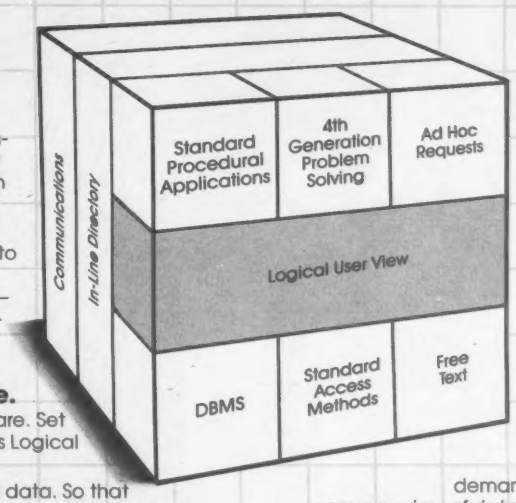

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crypted data available for scrutiny.

2. Each record's IV is a function of the clear and ciphertexts of all the preceding blocks. Therefore, IV is very likely to change from record to record. OFB is really only dangerous when identical IV/key configurations are reset for each record or short communication.

Which Mode When?

Now that we have looked at these modes of DES, the obvious question comes to mind. Under which circumstances should each mode be used? Should it be a DES software or hardware implementation? The immediate answer depends on all the relevant facts in any particular security situation (including the ever-important key management requirements). But it is possible to generalize to some degree:

1. Proprietary Communications. All three modes of DES may be used. Some hardware devices use OFB because it shares with ECB the distinction of having the highest throughput rates of all DES modes. Users should be careful with OFB for the aforementioned reasons. ECB may be effectively used in situations where there is little likelihood of repeated cleartext blocks. An undefinable amount of extra security is available via CBC mode.

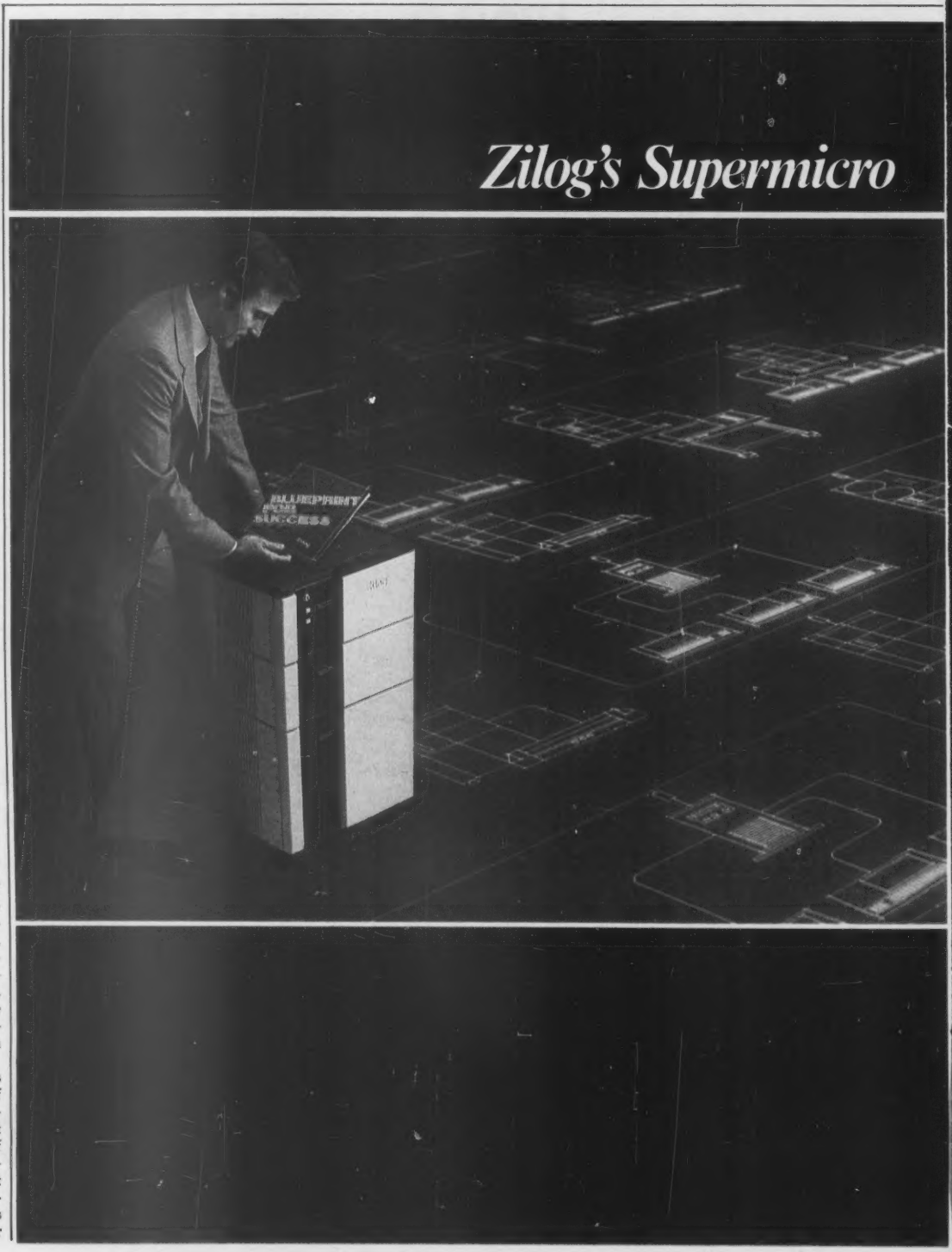
Most DES boxes use ECB. This avoids dealing with the IV and the added hardware (random-access memory, programmable read-only memory, microprocessors and so on) needed for CBC/OFB XORs and CBC temporary storage of preceding ciphertext blocks.

Where communicated data is the *only* security risk at an installation, hardware devices are the likely answer. If management foresees the need for encryption of on- and off-line data sets as well, then a software implementation is the much more general solution. In many cases, such a system can service communications and the other areas of data insecurity at a fraction of the price.

2. Files — Random Access Required. The protection of magnetic data sets is the domain of the highly efficient software implementations of DES. The software implementation is more general. It may be used for the protection of disk-resident data sets and archived tapes. The user has full choice and control over DES mode, multiple encryptions and the ability to encrypt particular fields within file records and so on.

One of the most desired data file protection scenarios is when it is necessary always to maintain a magnetic data set in encrypted form and, when randomly accessing records, *not have to decrypt previous records* to regain a cleartext record. This could be done using ECB mode, but there's that sticky problem of having to alter the record size due to padding.

The solution is to use CBC mode with OFB for the less-than-64-bit blocks at the end of each record. Of course, the same IV must be used for each record (the one used to encrypt it) in order to decrypt properly. When used this way, the system is called



PUTTING DES TO WORK

IN DEPTH

"CBC with terminal block truncation" (again, see Figure 4).

Protecting data sets in this fashion requires a two-step process. First, a linked runtime system is used to encrypt the entire file en masse. Second, all applications programs that access the previously unencrypted file use a subroutine system that decrypts individual records as they are accessed. This subroutine package acts as a glorified READ/WRITE CRYPTION statement.

3. Files — Random Access Not Required. It may be the case that random access with cryption is not necessary. For example, consider a payroll file that is accessed twice a month for generating checks. In this case, all modes of DES may be applied. For the sake of reducing error propagation and for speed, OFB used in the stream sense is a good candidate. Of course, a software system is required.

4. Fields Within File Records. In many cases, the proprietary nature of files results from information restricted to particular fields within file records. For example, a medical file may be adequately protected by encrypting only the patient's personal information (name, address, Social Security number and so on).

The advantages of field encryption are numerous. First, runtime (in other words, money) is saved if the cryption process is confined to a fraction of the file's contents. Second, the clear portions of the "encrypted" file are still accessible to existing application programs.

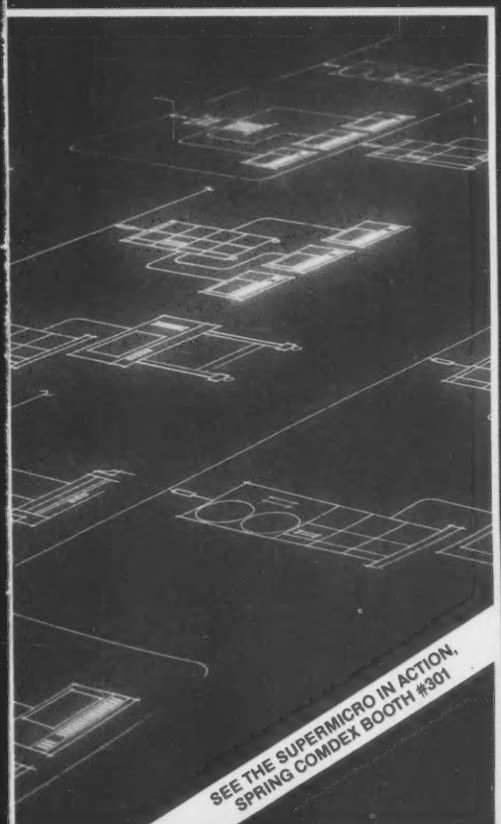
This technique can also be used to encrypt proprietary sections of records before providing files to applications programmers for program development and testing.

Because a field can be any length, CBC and ECB modes cannot be used. The only way to field-encrypt is to use OFB mode. When encrypting a 1-byte field, you simply XOR the 8 bits against 8 of the 64 produced by OFB. You can throw away the remaining 56 or save them for XORing against the next field's bits. As with CBC, OFB can be used, with the proper precautions, to decrypt randomly accessed records or entire files at once.

The output from OFB does not have to be directly XORed against cleartext. It can be used to map into character sets. So, if you are field-encrypting, it is possible to replace a field character-by-character with the same character set used in the cleartext. For example, an encrypted Social Security number can be made up of numeric characters only. This is nice for helping those applications programmers you may not trust. Or, if you plan on printing or displaying encrypted fields on a CRT, they don't throw your printer or CRT into spasms.

5. EFT (Electronic Funds Transfer). EFT security is an expansive arena with great interest in and need for encryption — but not encryption in the sense that funds transfers need to be protected against disclosure. They need protection against third-party fraudulent *change*: either insertion of il-

will free you from mini thinking.



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IN DEPTH

legal EFTs or modification of existing EFTs. With billions of dollars zooming over public telephone lines daily, this is not a small area of exposure.

The answer to this problem is the new American National Standards Institute (Ansi) Financial Institute Message Authentication Standard (Fimas). This technique uses CBC encryption and simply throws away the ciphertext. At the end of the chain is the final 64-bit value (now called a "MAC" for Message Authentication Code) that is highly dependent on the data (EFT) and the secret DES key. This value is transmitted with each unencrypted EFT.

On EFT reception, the same process is repeated and a new MAC is generated using the same DES key and EFT. If the two MACs agree bit-for-bit, then the communicating banks are assured that no one has inserted an EFT (our evil genius would need the protected key to do this) or has altered an existing EFT (again, the key is required). Fimas is the first authorized use of DES technology to take advantage of its sensitivity to bit changes rather than its ability to encrypt.

MAC generation is currently handled by software systems at a bank's host mainframe and can be verified at EFT terminals using hardware if the process is automatic, or, if manual, a microcomputer (with CBC software) can be used at EFT destination points to confirm the received MACs.

6. ATM PINs (Automated Teller Machine Personal Identification Numbers). Encryption is required to protect these proprietary numbers (you punch them in on a keypad at your favorite robot teller) while in transit between the ATM and "host" mainframe. These numbers are usually small, less than 64 bits, and are best ECB-encrypted with blank or random-bit filling to complete the block. OFB mode could be used, except the key management problem would be complicated by the use of an IV. ATMs sometimes employ DES hardware (which is almost always ECB mode), and software, if it is fast enough, is used at the mainframe to decrypt and verify a valid PIN.

Use of encryption technology, both hardware and software, is increasing tremendously with the establishment of interbank ATM networks. If you care to use your First National Bank card at Second National Bank's ATM, just wait a few months. Security is now an absolute necessity. Each bank will be handling the other bank's customers' PINs.

Standards must be established. DES, used in ECB hardware and software forms, is the chosen solution.

Security: A Final Word

The security of DES has come under fire by some academic critics. These criticisms rapidly lose any mathematical justifications as they make their way into computer industry trade journals. As a result, nonacademic types are left with a hazy feeling that DES is an insecure algorithm.

DES is now up for its sched-

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uled (this is not some emergency session) five-year review by the National Bureau of Standards, so it is important to shed some light on this situation.

First, independent of alleged weaknesses in DES security, having DES technology is certainly much better than not having it at all. It is estimated that more than 90% of EFTs have no encryption or encryption-related technology to protect them. The problem here is not one of algorithmic security; it is getting financial institutions to wake up and take reasonable steps (DES) to protect themselves.

Second, the choice of algorithm is guided by an institution's estimation of the expected threat. Who is out to defraud you? Is it the KGB, NSA (National Security Agency) or MIT? If it is any of these formidable three-letter institutions, you may be fighting a losing battle. But in almost every instance, DES is used to protect against outside parties who have much more knowledge of system penetration techniques, active wire tapping procedures, bribing personnel and so on than they have about the intricacies of elegant cryptanalysis. How many brilliant underground cryptanalysts are out there?

Third, the very academics who criticize DES are not faring as well as they would like with their own cryptological creations. *The Los Angeles Times* recently reported (May 12) that Adi Shamir, from the Weizmann Institute in Rehovot, Israel, cracked the Merkle-Hellman "trapdoor knapsack" cryption system. This doesn't and shouldn't shake Ralph Merkle and Martin Hellman. They realistically replied that their algorithm is only weak when it is used to transform data *only once*. Their solution: Reencrypt until you feel confident. Shamir agrees.

The same line of thinking applies to DES. ECB DES *may* be insecure (although to this writer's knowledge no one has yet published the algorithm that undoes it), but DES can be reinforced by understanding and using the modes of DES. What would the academics say about the security of your encrypted data if it was the result of two ECB, one CBC and a final OFB encryption? And, if proper precautions were taken, how would the potential data thief even know what combination of modes are in use? He could spend thousands of hours searching for a nonexistent single ECB key.

Finally, let's consider the "worst" case: Suppose you are using ECB mode. Proper key management practices can strengthen your ciphertext. All evidence indicates that if and when there is some way to break DES, it must take a relatively large amount of computer time to determine a key. It is possible that changing keys at regular intervals would restrict the amount of ciphertext and time available to the cryptanalyst. By the time a key is illegally computed, another key is in use.

The controversy should not center around the ultimate security of DES. The real problem is how, when and where to implement it, how to manage keys and, most important, how to get major companies, especially financial institutions, to wake up to the risks they are taking before it's too late.

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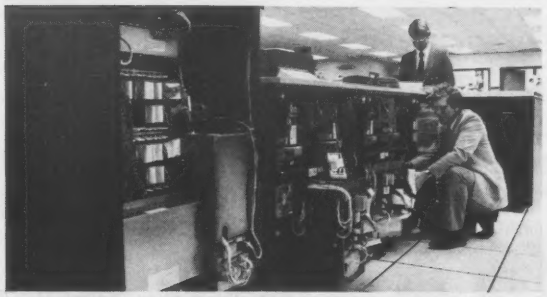
About the Author

Michael Schwartz is owner and founder of Prime Factors, a 2½-year-old Oakland, Calif., firm that specializes in software encryption systems for mainframes and minicomputers. Prime Factors has installed DES software, from Fortran source to high-speed file-oriented assembler systems, for public- and private-sector organizations.



In photo (left), Robert Holeman, Corporate Systems' director of computer services, watches as NAS' Larry Hayward adjusts the Model 7360. In photo (right), Darrell Six, operations manager, stands between the finished product and Model 7350 disk drives.

First U.S. User Gives Kudos to Subsystem

AMARILLO, Texas — Corporate Systems, Inc. surprised itself and a number of its clients late last year by picking up its entire data processing operation, moving it across town and having it up and running in less than three days. That is no small feat when you are dealing with a large-scale dual-mainframe system and have more than 300 client terminals tied into your network.

Last month the firm made another move — this one not so physical — by becoming the first U.S. user of a high-capacity disk storage subsystem that had been available only in Japan.

Corporate Systems — which supplies computer-based risk management information systems to a variety of companies, including more than one-third of the Fortune 500 firms — boosted the storage capacity of its present 16-disk system 50% by adding a National Advanced Systems, Inc. (NAS) 7360 disk storage subsystem. While the subsystem contains only two disk drive units, the 7360 A4 and B4, it furnishes the same capacity as eight of the firm's current NAS disk drives. The 7360 also reportedly requires less floor space, cooling and electrical power.

The 7360 "gives us the opportunity to serve our customers better and the capability for virtually unlimited growth of our on-line network," Don Riggs, the firm's vice-president, said.

Corporate Systems' CS-On-line Network is an international teleprocessing system that presently serves more than 1,000 accounts. The system is based on two processors, an NAS AS/5000 and an AS/7301, and more than 300 client terminals are tied into the network.

When the firm moved all of its equipment into a new crosstown facility last summer [CW, Sept. 14], its on-line network reportedly lost only a day's service, even though most of the technicians involved with the system predicted a downtime of at least five days.

The firm decided to install the NAS drives not only to boost its storage capacity, but to offer additional customer services that were not available in the past. One of these new services involves a special interactive programming system that allows customers to develop their own programs, Riggs explained.

By using the Japanese disks — which incorporate a dual-porting feature, dual-rotary actuators in each head-disk assembly and a closed-loop air filtration system — Corporate Systems also hopes to boost its overall subsystem throughput by as much as 44% and reduce average disk seek times by up to 20%.

Each Model 7360 drive provides 1.27M bytes of storage, while each single-address Model 7350 has a 317.5M-byte capacity. The 7360 A4 unit also contains a dual-string controller and is connected to the firm's Model 7860 control unit. A full-configured disk and controller string provides a total of 2.54G bytes of data storage.

Corporate Systems plans to replace all its 7350 and 7835 control units with 7360 disks within the next four years.

STC Unveils Dasd Subsystem for 4341s

LOUISVILLE, Colo. — Storage Technology Corp. (STC) has introduced a direct-access storage device (Dasd) disk subsystem for IBM 4341 series and compatible computers that features a dual-port architecture and two storage directors.

The design of the Model 8675 subsystem reportedly facilitates rapid I/O as well as reduced seek, latency and rotational-position-sensing miss times. The disk's storage capacities range from 2.54M bytes with eight single-density spindles to more than 5M bytes with eight double-density spindles, a spokesman said.

The 8675's standard dual-port feature allows two simultaneous transfers from any two spindles on a string, reportedly delivering an improvement in subsystem throughput over string switch configurations. The dual-porting also gives an alternate path in the event of a "busy" condition, providing improved data availability and a redundant path in the event of an unscheduled hardware outage, the spokesman noted.

The subsystem offers two data mapping formats: cylinder interleaved and back-to-back volume mapping. The former is said to reduce average seek time by mapping the logical cylinders of the primary and secondary volumes onto adjacent cylinders. This reportedly permits single-density performance on both volumes and reduces intervolume contention, yielding a single-volume average access time of 23 msec, the spokesman explained.

On the other hand, back-to-back mapping places volumes, not individual cylinders, adjacent to one another, yielding a single-volume average access time of 18 msec. The latter is used for high-speed, intervolume access for use with high-activity data sets, he noted.

Optional features for the subsystem include a two-channel switch pair that provides four-channel access to an 8675 with each of two directors attached to two independent channels and a four-channel switch pair that provides eight-channel access to a subsystem with each of the two directors attached to two independent channels.

The Model 8675 costs from $155,700 to $234,100, depending on configuration. It can also be leased for $4,650 to $6,696/mo based on a 36-month lease that includes total service.

STC is located at 2270 S. 88th St., Louisville, Colo. 80027.

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In addition to this feature, you'll see several articles on current happenings in all aspects of OA. All-in-all, a great follow-up to the first issue of *Computerworld OA*.

So, watch for the next issue of *Computerworld OA* on June 23rd.

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System Breaks Path Through Legal Jungle For Business Firms

FALLS CHURCH, Va. — If a manufacturer's product is legal in Louisiana, is it OK to market it in Idaho?

Probably, but there are still a few legal hurdles and red tape a company must overcome in order to get a product from the production line to the consumer. And it doesn't hurt to have a computer help find a path through the legal jungle.

On the average, state legislatures and regulatory agencies pass approximately 20,000 new regulations each year that have the potential to affect businesses. It is important, therefore, for executives to perform the near-impossible task of keeping abreast of current laws and know the particular laws and regulations of each state.

Fortunately, there is a company that provides such information on a daily basis — with the help of a Hewlett-Packard Co. computer. State Services Group (SSG) of the Martin Haley Companies provides firms with industry-specific data regarding legislation that may affect them. Clients obtain reports by describing a bill giving the latest action taken on the date of the next hearing, according to Jane Wilson, the firm's president. They have direct access to the data base via telephones using their own terminals and can receive either hard copy or call data forth on the CRT screen.

Staff and business clients of the State Services Group review current data on legislation that may affect the business community. An HP 3000 tracks legislation in both houses of each state, as well as some 20,000 regulations passed by various agencies within each state.

SSG reporters gather and then key in legislative data to the HP 3000. The data is later disseminated to clients via the computer and scattered terminals.

SSG installed an HP 3000 in 1979. The system has 1M byte of memory and seven in-house terminals. It also has three HP Model 7925 disk drives with a total memory of 360M bytes.

Tracking the Legislature

The process of tracking the long arm of the legislature begins with reporters in each of the 50 states. At the end of each day, these people forward new data — bills introduced, and any amendments or actions — to the Falls Church headquarters. Larger states are accessed directly by computer, while reports from smaller states are dispatched via the mail, Wilson explained.

Reporters at SSG assign each state's input to a specific category; new legislation is entered by state and official bill number, which is the key indentifier. Other data includes a brief description of the bill, the sponsor, the date introduced and committee referral, she continued.

Once the material is filed in the HP 3000's data base and is under the control of the computer's Image data base management software, information can be extracted by bill sponsor, number or category. Reports can also be prepared that include information from a variety of areas in the data base, she said.

Mini Bits

Micro Gets Price Cut

PENNSAUKEN, N.J. — Effective immediately, Franklin Computer Corp. has announced a $100 price cut on its personal computer, from $1,595 to $1,495.

The Franklin Ace 100 made its debut in March. It is reportedly hardware- and software-compatible with Apple Computer, Inc.'s Apple II microcomputer, but also features 64K bytes of random-access memory.

Franklin Computer is located at 7030 Colonial Highway, Pennsauken, N.J. 08109.

Altos Cuts 8000's Prices

SAN JOSE, Calif. — Altos Computer Systems, Inc. has made price cuts of more than 10% for its 8000 series of hard disk multiuser microcomputers.

The ACS8000-10, a 10M-byte unit, has been reduced by $510 to the price of $7,990. The ACS8000-12, a 20M-byte hard disk microcomputer, has been lowered by $1,000 to the price of $8,990. The 40M-byte ACS8000-14 now costs $10,990, a $1,000 reduction.

The ACS8000-10, -12 and -14 will now be shipped with the Digital Research, Inc. MP/M operating system, worth $500.

Altos also announced that prices of the 8- and 16-bit MTU-2 and MTU-3 magnetic tape units with 17M-byte storage capacity have been cut by $1,000 to $2,500.

Altos is located at 2360 Bering Drive, San Jose, Calif. 95131.

Medical System Debuts

INGLEWOOD, Calif. — A medical computer system that warns physicians of potentially adverse drug reactions has been developed by Compunet, Inc.

Medsafe also stores and updates patient medical records and does accounting, patient billing and third-party billing functions. The system covers the interaction patterns of more than 6,000 prescription and nonprescription drugs.

The system comprises three components: the terminal unit, including an 8-bit Intel Corp. 8085A computer, keyboard and display screen; high-density storage unit with 20M-char. capacity; and 120-char./sec bidirectional dot matrix printer. The computer features two banks of 64K dynamic random-access memory.

Prices start at $21,000 from Compunet at Suite 570/575, 11222 La Cienega Blvd., Inglewood, Calif. 90304.

Xylogics Announces 672, 536 For Use With DEC Processors

BURLINGTON, Mass. — Xylogics Corp. has announced the Models 672 and 536 emulating peripheral processors for use with Digital Equipment Corp. processors.

The 672 provides control for 9-track, ½-in. streaming tape drives for DEC PDP-11 or VAX-11 processors. The unit resides on a single quad-size printed circuit board and plugs into any Unibus slot in the host backplane.

The 672 can control several streaming tape drives and users can select the start/stop mode at up to 25 in./sec or the streamer mode at up to 100 in./sec, the vendor said. It costs $2,000.

The 536 operates with DEC's RLV21 or RL02 disk subsystems and provides up to 40M bytes of on-line storage in the emulating mode and 80M bytes in the nonemulating mode. The unit incorporates an Advanced Micro Devices, Inc. 2901 16-bit microprocessor and provides operating and diagnostic commands.

The 536 also features an exerciser and format programs along with a 1,040-word buffer capacity, according to a Xylogics spokesman, who priced the unit at $2,500.

Xylogics is based at 144 Middlesex Tnpk., Burlington, Mass. 01803.

Diskstor-M Fits Multibus, Q-Bus Systems

WALTHAM, Mass. — Comark Corp. has announced Diskstor-M, a disk subsystem for Intel Corp. Multibus and Digital Equipment Corp. Q-bus systems.

Diskstor-M includes an 18M-byte Winchester disk drive and a 1M-byte floppy disk, an 8-bit Intel 8085 microprocessor or a 16-bit Intel 8086 microprocessor, either 64K or 128K bytes of memory and serial and parallel interface ports. The Winchester disk is expandable to 36M bytes and memory is expandable to 1M byte, Comark said.

An 8-bit system costs $12,469; a 16-bit system costs $13,540. Comark can be reached at 257 Crescent St., Waltham, Mass. 02154.

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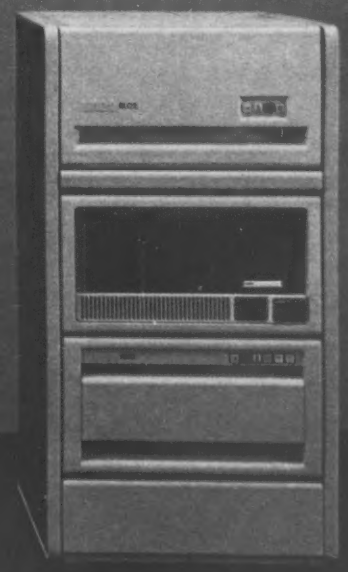

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Portable Micro Features 9-In. Screen, Z80A CPU

DEL MAR, Calif. — Non-Linear Systems, Inc. has a portable microcomputer that features a 9-in. CRT screen, a Zilog, Inc. Z80A central processor and up to 64K bytes of random-access memory.

The Kaycomp II measures 18-in. wide by 8-in. high by 15½-in. deep. It is self-contained — packaged in a metal carrying case — and includes two floppy disk drives offering 200K bytes of unformatted storage and a keyboard with a 13-key numeric pad, the vendor said.

The computer runs under Digital Research, Inc.'s CP/M operating system and includes MBasic and Multiplan, both manufactured by Microsoft, Inc. The system costs $1,795 and will be available for delivery next month, a spokesman for Non-Linear Systems said. The firm can be reached through P.O. Box N, Del Mar, Calif. 92014.

Memory Units Refurbished

NEWTON, Mass. — EMC Corp. has made available refurbished 256K-byte memory units manufactured by Prime Computer, Inc.

The memory units are cleaned, screened and tested, and any defective components are replaced, according to an EMC spokesman. The quality-control checks include testing on the vendor's memory tester and a functional test on the company's Prime computer.

The memory units are priced at $4,000 for the E4 memory, which runs on all Prime systems except the Prime 750 and 850. The E6 memory, which can be used in the Prime 750 and 850, is priced at $4,400. More information is available from EMC, 385 Elliot St., Newton, Mass. 02164.

Codata Unveils Storage Options

SUNNYVALE, Calif. — Codata Systems Corp. has announced two storage options for its Motorola, Inc. 68000-based CTW-300 Multibus microcomputer system.

The options, comprising 80M-byte Winchester and 9-track tape drives, are made possible by an integral Multibus controller, according to the vendor. The 8-in., 80M-byte formatted Winchester drive, made by Fujitsu Ltd., provides on-line storage.

The 9-track tape system, made by Kennedy Co., is said to feature 800 to 1,600 bit/in. storage at 45 in./sec. The disk drive costs $15,000, and the tape system costs $9,845 from Codata, 285 N. Wolfe Road, Sunnyvale, Calif. 94086.

MDB Serial Interface Designed for LSI-11s

ORANGE, Calif. — MDB Systems, Inc. has introduced an asynchronous serial interface for Digital Equipment Corp.'s LSI-11 computers that boasts DEC DLV11-F compatibility plus a "buffer ready" signal capability.

The Printer Busy monitor reportedly increases computer throughput when used with printers that do not provide X-on/X-off protocols, or the software does not monitor these protocols.

It can be connected to a variety of serial interface printers, including Texas Instruments, Inc.'s 810, Centronics Data Computer Corp.'s 704 and the Teletype Corp. 40, the vendor said.

The Printer Busy interface costs $385 in single units, and MDB is based at 1995 N. Batavia St., Orange, Calif. 92665.

Ramtek lends color to your decisions.

There are dozens of ways to effectively use the color-graphics created by a Ramtek 6211. Computer aided design; process monitoring & control; business information systems; mapping research & science—to name a few of them.

The 6211 is a complete terminal with a high resolution color monitor and display electronics. You can display 16 colors at once from a palette of 64 and choose screen resolutions of 640 x 480 or 512 picture elements. The 6211 also offers a light pen or graphics tablet as options, as well as a rack-mount version.

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For hard copy, couple the 6211 with a Ramtek 4100 colorgraphic printer for quick inexpensive quality plain paper copies. Its exclusive four-head design produces full color in a single pass. With separate, easy-to-change re-inking ribbons, there are no messy toners or chemicals to replace. The 6211 can also be used with a color camera for 35mm slides, 8 x 10 or 4 x 5 prints, or overhead transparencies.

A full range of off-the-shelf graphics software packages are available for the 6211. And Tektronix 4014 emulation allows Tektronix users to work with 16 colors instead of just one.

And between now and June 30, 1982, you can enjoy an added benefit—a 6211/4100 package price. For more information on the package or on separate item prices, call Ramtek at 408-988-1044.

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Finite element model displayed created by PATRAN, a product of PDA Engineering

Usual OA Measure For Productivity Called Irrelevant

By Robert Batt
CW West Coast Bureau

HOUSTON — Traditional approaches to measuring office productivity came under the gun at a recent National Computer Conference session on "Office Automation and Knowledge Worker Productivity."

The usual industrial engineering approach to productivity is completely irrelevant for office work, claimed James Carlisle, president of Office of the Future, Inc. "To worry about head counts and hours saved is a waste of money and management time. The real issue is not a matter of saving time, it's a matter of making a process work," he asserted.

Carlisle maintained that office technology is the process of improving corporate communications and control. What managers need most is corporate control systems, he continued. "At the senior management level, it's the qualitative effects that result in productivity improvements," he added.

Carlisle forecast that patterns of information management will change as office technology is introduced into a corporation. In this connection he claimed that managerial costs are rarely properly managed. Most senior managers, he maintained, have, on average, around $60,000 of capital investment backing.

Speaking on productivity in the office, Anne Mayfield of Arthur D. Little, Inc., said the emphasis should be on results.

"Productivity is only one issue to be considered throughout the office automation, strategic planning and information process," she asserted. Mayfield outlined six stages in the measurement process:

- Education and awareness.
- Determining user needs and requirements.
- Development of a strategic plan.
- System selection and planning for implementation.
- System implementation.
- Ongoing support.

For Bill Galitz, founder of Galitz, Inc., a company specializing in human factor design, the issue is not the technology, but whether people are ready for office automation technology and its factors.

"We have the opportunity either to solve our communication problems through office automation or to broaden the problems of communications in large corporations," he told the session. People are going to have to confront change, and in the process some will fear they are going to lose control over computer technology.

Disk Drive Debuts For Wang OIS 140

BEDFORD, Mass. — Continental Resources, Inc. has announced a plug-compatible, add-on disk drive for Wang Laboratories, Inc. OIS 140 systems.

The Model CRI/W9448-96 is said to emulate the operation of Wang's Wang/Phoenix cartridge module drive. The disk drive has an unformatted capacity of 96M bytes and a formatted capacity of 80M bytes.

The drive is available in 30 days; it is priced at $9,895 from Continental Resources, 175 Middlesex Tnpk., Bedford, Mass. 01730.

Chips, Users Seen Key to OA's Future

By Bob Johnson
CW New York Bureau

HOUSTON — The future of office automation will be influenced by two major technological advances. Semiconductor chips will allow office equipment to carry out more functions, and machines will be dedicated to non-DP users.

That was the message delivered by Christian Mueller-Schloer, leader of the session on "Advanced Technologies for the Office" at the recent National Computer Conference here.

Schloer said that the office machines of the future will have to be able to tell the user exactly what to do. He stressed that people involved with office automation must understand that the simpler the operating procedures, the better.

Schloer said one area that relates directly to user simplification is command languages, a subject discussed by David Beech of Hewlett-Packard Co. Laboratories in Palo Alto, Calif.

Need for Universal Language

Beech said that the office automation industry must first ask itself why there is a need for a standard office automation command language. He reasoned that a computer should be as easy to use as a telephone, but noted that it is not yet that simple.

"There should be a universal language for OA systems that can be understood by all users, including all nationalities," he said.

The speaker said that there should be little actual instruction needed to perform functions and a command language needs to be designed that will meet that criteria. "If this type of language was created, users could use any type of system that supported such a standard," he said.

Beech cautioned that if commands to perform functions other than the most basic remain as complicated as they currently are, users will get in the habit of letting only experienced DPers do the tasks.

"If users see that it is complicated to work computers, then only the people who enjoy that type of work are going to enter into the industry," he said.

Beech offered a framework for designing a standardized command language. First, it has got to be one language with few programming languages, he said, noting that symbolic commands and abbreviations are "disasters" that confuse users and should be avoided.

"The model that should be used for this kind of language will include a verb and then some operand," Beech stated. (An operand is an instruction.) He also predicted that audio input is in the future of office computers.

WP Package Out For DEC VAX-11

HOFFMAN ESTATES, Ill. — Microsystems Engineering Corp. has announced Mass-11, a word processing package for Digital Equipment Corp. VAX-11 series processors.

The package features word processing, list processing, redlining, footnoting, glossaries and form letter production, the vendor said.

The package costs $10,000 per processor. An optional data base management package costs $2,500, the vendor said from 2400 W. Hassell Road, Hoffman Estates, Ill. 60195.

Panel Agrees: Consider the Fit Before Installing OA System

By Tom Henkel
CW Staff

HOUSTON — Many companies compound their office problems by installing office automation systems.

According to a panel of consultants at the recent National Computer Conference here, many firms buy office automation hardware without actually considering how it fits into their business objectives. The result tends to be more paperwork, less productivity and higher costs, according to Michael Hammer, president of Hammer & Co., a Cambridge, Mass.-based firm.

"Offices are not factories," and productivity cannot be measured by the volume of memos produced in a given day, Hammer said. Often a company switching to an office automation system spends more time tending to system-related details than on the actual business of running the company.

To avoid problems in developing office systems, firms should develop a task force made up of management and the people actually involved, Hammer said. "Offices can be configured, then it becomes the task of the office automation director to sell the system to the rest of the company."

Hammer suggested using a somewhat subtle approach to win over the division. Instead of simply issuing an edict that division managers must accept a given system, Hammer suggested that office automation managers spell out the advantages of the system and how the office automation staff can provide training, volume purchase discounts and other support for the system. If that approach fails, the firm president suggested telling the division that he will be treated like a leper if he does not accept the system.

Another way to gain support for an office automation system is to set up a test site within the company. The test site should be located anywhere but the data processing department, because other company divisions tend not to place a lot of faith in test sites in the DP department, he noted.

Not all company divisions are suited for office automation. Howard L. Morgan of the Wharton School at the University of Pennsylvania said that technology is only a part of the total office automation picture because technology is only valuable if it helps achieve a company goal.

Digital CP/M Gets WP Package

BERKELEY, Calif. — Perfect Software, Inc. has introduced a word processing software package for use with the Digital Research, Inc. CP/M operating system.

Perfect Writer reportedly uses virtual memory architecture, allowing the editing of documents larger than the computer's memory. Such architecture is said to make possible the editing of documents as long as 200 pages.

In addition, the package's combined virtual memory and multiple-file buffers allow the user to view and edit two files on the screen at the same time. The software costs $389 from the firm at 1400 Shattuck, Berkeley, Calif. 94709.

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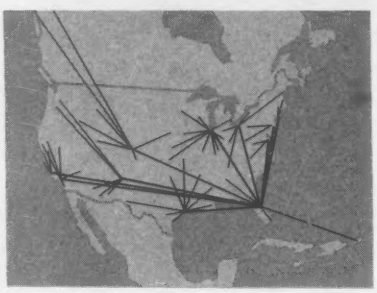

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As Yet Only for New Lark Drives

CDC's ISI at Odds With Ansi Standard?

By Marcia Blumenthal
CW Staff

Control Data Corp.'s Intelligent Standard Interface (ISI), announced at the National Computer Conference earlier this month, appears to be at odds with the Intelligent Peripheral Interface (IPI) standard being developed by a committee of the American National Standards Institute (Ansi).

Although, to date, CDC has implemented ISI only on a newly introduced model of the Lark family of 8-in. Winchester disk drives, the firm said it will begin incorporating ISI on its tape products in 1983.

In making the announcement, Thomas G. Kamp, president of CDC's Peripheral Products Division, stressed the company developed ISI because users need flexibility to upgrade their systems by adding peripherals. ISI is a common interface that can be used with disks, tapes or printers, he said.

The interface includes a data buffer between the peripheral device and the central processing unit. This allows data transfer at any rate the CPU chooses, up to the maximum transfer rate of the CPU or peripheral, CDC said.

The ISI architecture uses control modules specific to the peripheral being integrated into the system. These modules can perform error correction and have self-diagnostic capability, the company said.

Today, the company's Storage Module Device (SMD) interface is the standard for disk interfaces, Kamp noted, adding that the firm would continue supporting the SMD interface on all 8-in. and 14-in. disk products introduced this year. While support for SMD will continue, Kamp indicated that ISI is clearly CDC's future interface strategy.

But those working on the Ansi committee for IPI are in no way as enthusiastic about ISI as is CDC. Last year CDC brought ISI to the Ansi committee developing IPI, which tried for six months to convince CDC to make ISI more useful, according to Dal Allen, vice-chairman of the Ansi X3T9.3 committee responsible for IPI.

In particular Allen's comittee noted that ISI would not come

(Continued on Page 58)

CDC Unveils Disks, Tapes, Interface Strategy

HOUSTON — Control Data Corp. announced seven new disk and tape products and outlined a new interface strategy at a press conference during the National Computer Conference here earlier this month.

Although CDC markets its peripheral products primarily on an OEM basis, with $1.5 million in sales last year, its Peripheral Products Division is considered the largest and one of the most technologically advanced suppliers of non-IBM-compatible peripherals.

In addition to making known its interface strategy (see related story), CDC's peripheral product introductions emphasized the scaling down in size of its peripheral units while retaining the power of larger units. In that vein, CDC announced two 230mm devices — the 9710 Removable Storage Drive and the 9715 Fixed Storage Drive. These units are about the size of 9-in. disks, but have the capacity and speed of the firm's family of 14-in. products, a company spokesman said. They are functionally interface-compatible with the company's 14-in. module drive family. The 9710 is priced at $4,370 per unit in quantities of 1,000, and the 9715 is priced at $4,405 in the same quantities.

The smallest device introduced by CDC was the 9415 5¼-in. Winchester, dubbed the Wren. Although many other firms have introduced such products, CDC's entry into the 5¼-in. Winchester was deemed a recognition of the viability of the product, one observer noted.

The Wren is offered with either 19M bytes or 32M bytes of storage. The device is available with two interface options; the first, which is compatible with the company's 5¼-in.

(Continued on Page 64)

At Sperry Univac, Honeywell

Major Marketing Shifts In Place

Two major internal marketing shifts were engineered recently at Sperry Univac and Honeywell, Inc.

At Sperry Univac, the worldwide marketing and services organization was abolished, placing U.S. and foreign sales under the direction of Univac President Joseph J. Kroger. Kroger was recently named a corporate group vice-president in charge of the new Information System Group., which consists of Univac.

Subsequently, three key Univac executives have been reassigned. John C. Butler has switched from executive vice-president of worldwide marketing and services to vice-president and general manager of the Americas Division, Charles E. Williams has become vice-president and general manager of the International Division and Joseph J. Ciasullo has been named vice-president of worldwide customer and marketing support services.

The realignment was designed to shorten internal lines of communications with regard to customer services, according to Kroger.

Meanwhile, at Honeywell Information Systems, Richard R. Douglas, the former group vice-president of the International Division, has been named the company's top marketing executive in U.S. marketing and services. Douglas replaced Michael J. Keliher, who has been placed on special assignment.

Douglas' new post has also been relocated from Waltham, Mass., to the company's Minneapolis, Minn., headquarters, in a move to centralize top Honeywell personnel.

The move follows an earlier corporate realignment of the firm's Small Systems and Terminals Division in which office automation products were spun off into a new division called the Office Systems & Terminals.

Supershorts

Honeywell, Inc. has agreed to sell more than half its interest in CII-Honeywell Bull to a state-controlled company in France. The transaction, scheduled to be completed later this month, reduces Honeywell's interest in CII-Honeywell Bull to 19.9% from 47%. The sale will bring in $150 million.

— — —

Sperry Univac and Mitsubishi Electric Corp. have forged a cooperative agreement that includes exchange of technologies for developing computer systems. Besides technology exchanges, the two firms said they will cooperate in manufacturing, marketing and research and development.

— — —

The rumored joint manufacturing agreement between IBM and Matsushita Electric Co. is nearing completion, according to Japanese sources. Under terms of the venture, IBM Japan and Matsushita will jointly produce IBM's Personal Computer and certain peripheral equipment. IBM Japan is expected to establish a wholly owned subsidiary later this year called IBM Marketing Japan, the sources said. This organization is expected to manage contracts with third-party distributors handling IBM's System/23 Datamaster and later purchase the products produced by the joint venture and consign them to distributors.

Leading Disk Manufacturers Agree To Design Microdiskette Standards

By Tim Scannell
CW Staff

HOUSTON — Four leading disk and disk media manufacturers announced plans here recently to discuss and work together to formulate microdiskette standards.

At an early morning press conference held just an hour before the National Computer Conference opened for its second day, executives from Shugart Associates, Inc., Verbatim Corp., Dysan Corp. and Tabor Corp. revealed they have agreed to exchange ideas and hold frequent meetings focusing on the physical design of microdiskettes.

Microdiskettes are magnetic devices that resemble standard floppy disks, but are usually from 3 to 4 in. in diameter. Although not currently in widespread use, they will be an important aspect of the future portable computer market, executives at yesterday's meeting said.

The agreement — a first for U.S. manufacturers — parallels a similar announcement made recently by top Japanese makers of floppy disks. While the U.S. firms will consider the Japanese manufacturers' disk design recommendations and have invited them and other foreign firms to join the new group, there are currently no plans for the U.S. and Japan to work together on the issue, the executives noted.

The objective of the group is to formulate a worldwide standard for microdiskettes to increase the growth of the burgeoning portable computer market, according to George

(Continued on Page 64)

CDC's New Interface Strategy Sparks Criticism

(Continued from Page 57)
under the Federal Information Processing Standards (Fips) 60 and 61 covering block multiplexer channels. "Anyone who sells CPU's that cost more than $400,000 has to meet those standards," Allen explained. ISI cannot be used between a peripheral and control unit if the control unit has to work on a channel that comes under Fips 60, he said.

Moreover, ISI is only 16-bits wide and is unsuitable for an 8-bit bus design, which is prevalent on smaller systems. So CDC is leaving out both the large and small manufacturers in the design of the interface, he said. And the speed of the interface is too slow, he maintained.

The federal government is the largest user of data processing equipment and all manufacturers have to live with standards required by the government.

Another source, who asked not to be named, claimed that NCR Corp., one of CDC's largest OEM customers, will not adopt ISI.

"The computer industry is no longer what it used to be where one company can do things in a way peculiar to its own design," observed Richard C. Layer, market development supervisor for 3M Corp. To succeed, CDC is going to have to gain the support of single board and semiconductor vendors, he noted. IPI already has a lot of momentum going with these suppliers, he noted. While CDC's Storage Module Device is the standard for disks, the firm may not be able to make ISI a standard in the industry, he said.

Originally CDC called its interface the Intelligent System Interface, but recently renamed it the "standard" interface, the unnamed source said.

CDC was unable to respond to the controversy before press deadline.

CDC Unveils New Strategy

(Continued from Page 57)
flexible disks and its 8-in. Finch units, with the second option being the ST-506 or ST-412 interfaces. Prices for the Wren are $1,415 for the smaller unit and $1,720 for the larger unit.

CDC also expanded its Finch series of fixed media drives, offering the 9410 in a 40M-byte version. In quantities of 1,000 the new Finch is priced at under $1,900.

A new model of the Lark family of 8-in. drives also debuted. The new model, the 9457, stores 50M bytes of data — 25M bytes each on fixed disk and on a removable disk cartridge. The new Lark also features the new ISI interface option or the standard SMD device. The unit is priced at $2,930 in OEM quantities.

In the extensive product announcement CDC also introduced a ¼-in. tape transport, the Sentinel, for data storage backup of 30M- to 160M-byte Winchester disk drives. And, finally, the company announced a new data streamer tape transport called the Keystone II.

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IBM, Japan, Inc., Start-Ups

CDC President Cites Challenges on Three Fronts

By Marcia Blumenthal
CW Staff

HOUSTON — Although IBM's latest disk products represent a "technological watershed" for the peripherals industry, IBM is clearly not "our only challenge," remarked Thomas G. Kamp, president of Control Data Corp.'s peripheral products business, at a press conference at the National Computer Conference recently.

"Japan, Inc. is for real," Kamp said. The improvement rate in their product technology indicates they will become serious competitors in the peripherals arena.

A third factor in the market is the presence of start-up companies such as Seagate Technology, Tandon Corp. and Micropolis Corp. There are about 300 companies manufacturing and marketing peripherals. And they are entering the market at the rate of one a week — 70 new companies in disks alone. Today there is ample venture capital money to permit "almost anybody" to start up, Kamp said.

Protecting its position in the disk and tape marketplace has required heavy capital expenditures by CDC. The firm has increased its research and development expenditure by more than 80% in the past two years. Moreover, the peripherals unit has added an Advanced Technology Division in the recent past. Technology emanating from this group includes thin film heads, an oxide binder system, metal disks, vertical recording and computer-aided design.

CDC's peripherals business is at the $1.5 billion revenue level today, rising from the $1 billion mark in the past two years. Peripherals account for about 43% of the company's computer-related business. Except for its high-end IBM-compatible peripherals, which account for 15% of peripherals sales, CDC sells its disk and tape units primarily on an OEM basis to 1,600 companies.

"But a $125 million investment in R&D isn't enough," Kamp declared. Besides in-house development, Kamp stressed, the firm is "leveraging our investment dollars" by forming joint ventures with other technologically advanced companies such as Burroughs Corp. and its Memorex unit. Kamp cited the company's thin film head factory venture with Burroughs as an example of this cash/asset leveraging strategy.

Recently CDC merged its printer assets with Centronics Data Computer Corp. and provided the New Hampshire printer-maker with a $25 million investment.

New Companies

Larson, Skriletz and Associates, Ltd. is a company offering consulting, education and organizational development services. It is located at 196 New London Tnpk., Glastonbury, Conn.

Matra Datavision, Inc. is an affiliate of the French industrial firm Matra and has entered the U.S. computer-aided design and manufacturing market with the opening of its U.S. headquarters at 99 S. Bedford St., Burlington, Mass.

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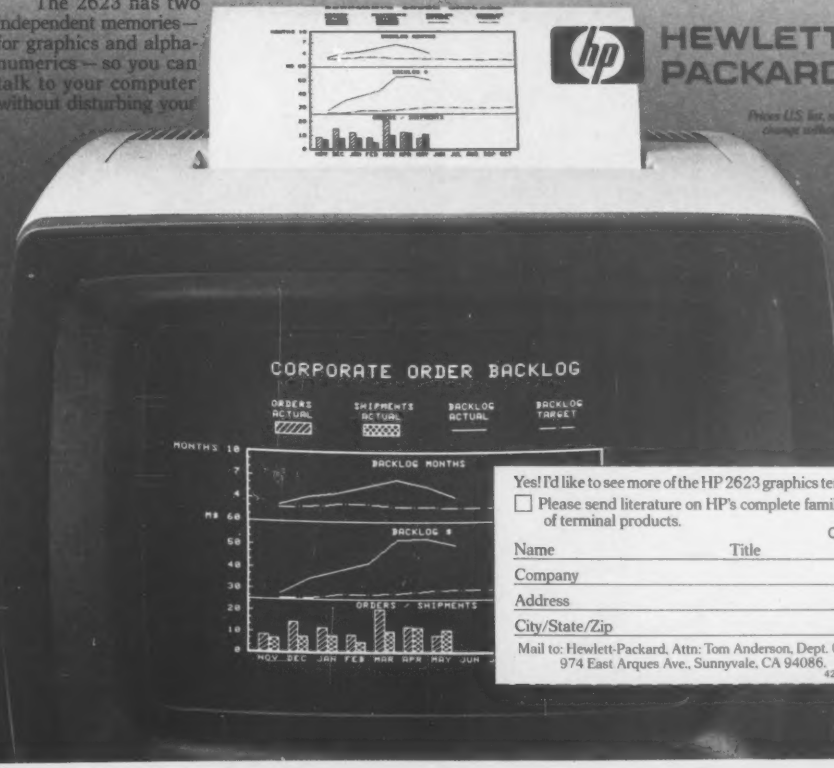

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Legal Expert Blasts Information Industry

By Jake Kirchner
CW Washington Bureau

QUEBEC CITY, Canada — Noted legal expert Justice M.D. Kirby recently accused the information industry of an amateurish and unsystematic approach to dealing with the societal effects of informatics.

In a paper presented to the International Information Industry Conference here earlier this month, Kirby, chairman of the Australian Law Reform Commission, suggested that the information industry finance establishment of an international institute for the study of legal and social implications of informatics.

Kirby was also chairman of an expert group on privacy and transborder data flow of the Organization for Economic Cooperation and Development. His remarks were presented to the industry conference here that brought together several hundred representatives of the world's major computer manufacturers.

Kirby asked the conference "whether the dynamic, generally prosperous and technologically adventurous information industry is responding adequately to the obligation to aid modern societies to study and solve the problems presented by its technology, including the law."

The pace of technological development and absorption into society is far faster than society's governmental and legal mechanisms can cope with, according to Kirby. He declared: "If the social and legal problems presented lie fallow and remain unattended, the successors of today's industry leaders will say that these were the years the locusts have eaten.

"Ultimately, the business you are in is one of serving a peaceful, contented, law-abiding and safe community," he said. "Social advance and acceptance must go hand in hand with technological change."

Kirby said he recognized that "the information industry is not a charitable institution. It pays its taxes," he said, and it "looks to government to sort out most of the problems that occur." He cautioned, however, that governments are not efficient enough to deal with the many and varied problems of informatics in a timely manner.

The answer, he suggested, is for industry to expand its research investments to include not only scientific research and development, but "disinterested research into the social and legal implications of the technology.

"Funds could be provided for such research under adequate guarantees of independence and objectivity and in ways that would ensure that competitive advantage was not secured by one organization over another. In this way the industry might come to be less reactive to the initiatives of ad hoc governmental enquiries, parliamentary and private bodies, new legislation and so on," he said.

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Product Specifics: The 2078 Display Station is built for flexibility, operating in bisynchronous as well as SNA/SDLC environments. It is built compactly to conserve space and even features a monitor that detaches for shelf placement. It is built to conserve energy, with efficiency features that allow the 2078 to operate on 58% less power while generating 41% less heat than its IBM equivalent. It weighs just 55 pounds, some 47% lighter than the IBM competition. And above all, the 2078 is built for people. The monitor is tiltable and the screen recessed. That screen, the keytops and all moldings are non-glare. The keyboard is movable for comfortable positioning.

The 2087 Matrix Printer also features SNA/SDLC protocol compatibility in addition to bisynchronous operation. It is both fast and quiet. A microprocessor-controlled print mechanism delivers high quality printouts at speeds up to 50% faster than the IBM equivalent. A bidirectional matrix print head seeks the shortest path to the next line, backwards and forwards, maximizing throughput. Acoustical engineering reduces noise levels, while a membrane switch panel, controls and LED indicators, all located on the front panel, provide the operator with local control and printer status.

The 2076 Remote Cluster Controller is a lightweight 30-pound package that accommodates up to eight printers and/or terminals in a bisynchronous environment. It measures a streamlined 6.5" high x 14" wide x 26" deep. While the 2076 can be located as far away as 4920 feet from its attachments, its dimensions allow for convenient placement just about anywhere, singly or stacked. Standard power-on, off-line and on-line diagnostics contribute to increased uptime.

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Firm's Flexibility Boosted by Dbase

By Robert Batt
CW West Coast Bureau

HOUSTON — After just 1½ years in business, microcomputer data base specialist Ashton Tate has built up a formidable reputation in the industry. The privately owned company has already acquired more than 8,000 users and numbers among its clients such giants as Xerox Corp., Ford Motor Co., Atlantic Richfield Co. and the National Aeronautics and Space Administration Jet Propulsion Laboratory.

On a visit to the National Computer Conference here earlier this month, George Tate, president of Ashton-Tate, announced that the Culver City, Calif.-based company will shortly be rewriting its Dbase relational data base system to run under OS/MVS on the IBM 370 series of mainframes.

This, Tate said, will give the system greater flexibility by allowing a greater number of records to be stored as well as allowing data movement between a micro and a mainframe.

'Important Implications'

"This will have important implications for the data processing manager because it will allow him to handle the problem of the proliferation of microcomputers within large organizations," Tate said. According to Tate, the current fear among management information systems (MIS) managers is that executive workstations will be implemented to such an extent that they will not be able to interface with the central data processing department.

Users, he added, should also be happy because they will still be under the shelter of the central processor while having more autonomy. As a result, user purchases of micros will not be so potentially disruptive, nor will users have to be surreptitious in their purchase of personal computers.

Therefore, when users exhaust the capacity of their micros, they will be able to transfer the data onto the MIS department mainframe." We are taking our data base system and moving it up to a new level. This will allow us to extend our current market," Tate asserted.

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Micro Aid Field Seen Nearing 'Platinum' Sales

By Jeffry Beeler
CW West Coast Bureau

HOUSTON — The low-end software field is fast approaching the age of "platinum programs" — packages that sell a million or more units, according to John Brackett, a senior vice-president with Softech Microsystems, Inc.

Brackett's comment alluded to the Hollywood recording industry, which has traditionally awarded a platinum record to any of its releases that top the million-copy sales mark.

Several microcomputer software products are already well on their way to becoming million-unit sellers, Brackett said during a session at the National Computer Conference, held here recently. Visicorp's Visicalc package, for example, recently found its way into the hands of its 250,000th user.

Brackett spoke during an NCC conference session called "Large-Volume Software Issues."

The arrival of the "platinum-program" age will confront software developers, distributors and users alike with a raft of sticky new problems:

- How can an offering that already has, for example, 100,000 or more copies installed in the field be rapidly and effectively upgraded?
- How can a supplier guarantee that each copy of a high-volume software package is exactly the same as all the others?
- How can a widely distributed program be protected from piracy?
- How can a vendor of such a mass-produced product ensure its quality?

Almost all these issues are peculiar to the high-volume software sector. With mainframe-oriented programs, which typically sell no more than a few hundred copies, such problems are seldom if ever pronounced, Brackett said.

Brackett described a large-volume software supplier or distributor as an organization that sells 10,000 to 250,000 copies of its product to inexperienced computer users, who typically buy the goods through retail outlets for less than $1,000/unit.

Another characteristic of large-volume software firms is the ability of their products to serve a broad range of customers rather than just one narrow, application-specific sector, according to Software Publishing, Inc. President Fred Gibbons.

Speaking at the same NCC technical session as Brackett, Gibbons accused the microcomputer hardware and software field of "overhyping" its products and giving users the mistaken impression that "computers can do everything."

Joining Gibbons and Brackett as panelists in the NCC session was Dave Steurwald, manager of strategic planning and publishing for IBM's Personal Computer.

Steurwald urged microcomputer software suppliers to stress high product quality above all other business considerations. "The key to success in the large-volume software market is getting a defect-free package, and the problem can be quite easily managed if you truly focus on it," he told his listeners.

Standards Agreed On

(Continued from Page 57)

Sollman, vice-president of marketing for Shugart Associates. Initially, the group will:

- Review current proposed standards.
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The group will first concentrate on disk media packaging — whether to have a soft or hard jacket — and then turn its energy toward the magnetic characteristics of the media. It will present its findings and offer suggestions at a meeting of the American National Standards Institute scheduled for September, according to James Campbell, president of Shugart.

The Japanese have been invited to join the American effort and most likely will join the group within the next three months, according to Malcolm Northrup, president of Verbatim.

However, it might be difficult for a foreign vendor without a U.S. branch office to participate in frequent meetings.

Other U.S. firms that are heavily involved in disk technology, such as Control Data Corp., have also been invited to join the group. IBM has not been contacted yet, but will probably join once the group activities get off the ground, the executives pointed out.

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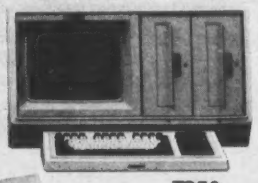
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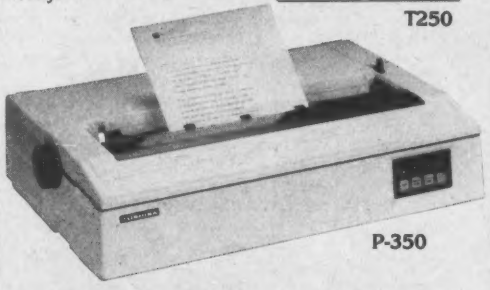
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Computer Specialist---$27,125 to $29,295 per year*
Incumbent will work with the director, Management Information Systems, in planning, programming and implementing new computer systems. A bachelor's degree in computer science or related field is required, plus one year of specialized experience in management analysis work and two years of specific experience at work approximating duties of this job.

Computer Systems Programmer---$27,125 to $29,295
(Academic Computer Coordinator)
Incumbent will work in the Computer Center, primarily with faculty and students to help satisfy their computing needs and coordinate systems programming staff's work with DEC software/hardware in academic computing. A bachelor's degree in computer science or a related field is required, as is three years of general experience, preferably in an academic environment, plus two years of specialized experience, including work with DEC-10 and DEC-20 software and MACRO. Related graduate studies may be substituted for general experience.

Computer Systems Analyst---$27,125 to $29,295 per year
(Lead Analyst)
Incumbent will perform analysis and design tasks within the Computer Center's Systems Development Section, which is responsible for developing future university computer systems and long-range plans for administering systems and programs. Qualifications required: six years experience, including three years progressively responsible general experience in data processing (a bachelor's degree in computer science or other related fields may be substituted); two years of specialized experience with CICS in an OS environment (COBOL is preferred but not required); and one year of specific experience in advanced computer equipment, in the applications systems design techniques, and in programming or systems.

Computer Programmer Analyst---$24,665 to $26,615 per year
Incumbent will be a lead programmer analyst in the Computer Center. Qualifications required: six years experience, including three in progressively responsible general positions in data processing (bachelor's degree in computer science or other related areas may be substituted); one in systems analysis and design techniques which demonstrate project management responsibility in at least one application area; and two years of specific experience.

Computer Program Analyst---$20,665 to $26,440 per year*
Incumbent will work under the general supervision of the director, Management Information Systems. Qualifications required: completion of all requirements for a bachelor's degree in computer science or other related areas; two years specialized experience in COBOL and PL/I; and one year specific experience in writing instructions and procedures, verifying or correcting logic developed by others, and interpreting and preparing specifications, flow charts, etc.

Management Analyst---$18,680 to $20,180 per year*
Reporting to the director, Management Information Systems, incumbent will be assigned a variety of complex projects of a non-repetitive nature. Specifically, incumbent will work on design of an Accounting General Ledger System and a Supply Inventory System of expendable items. Qualifications required: bachelor's degree in a related area; two years of specialized experience at organizing and utilizing human and material resources, assembling, correlating and analyzing facts, drawing conclusions, making oral and written reports.

Computer Programmer---$20,665 per year
(Senior Computer Programmer)
Incumbent will translate application system designs into plans of instructions and logic by which computers produce desired actions or products. Required qualifications: three years general experience (education above the high school level is acceptable substitute) and two years of specialized experience. Incumbent needs knowledge of overall design and operating principles of related computer systems; detailed and specific knowledge of the work processes, rules governing file design; and knowledge of computer related clerical procedures of the applications programs assigned.

Job Processing Supervisor---$17,000 per year
Incumbent will coordinate planning, scheduling and review of job requests and data input and output in Computer Center's Operations and Job Processing Section. Qualifications required: two years general office experience, preferably in a computer setting, plus three years experience related to duties to be performed; or two years of specialized experience and four years of computer training courses above the high school level; or any equivalent combination of experience, education and training.

Systems Programmer (Intermediate)---$18,680 per year
Incument will provide direct support and assistance in systems development. Required qualifications: bachelor's degree in computer science or related field; one year specialized experience in the operating characteristics of computer equipment and the support systems software required to develop application and test programs; one year of specific experience that indicates knowledge of current state-of-system software technology; knowledge of time sharing concepts and techniques; and knowledge of coding techniques.

Computer Programmer Analyst---$18,680 per year
(Programmer Analyst)
Incument will engage in fact-finding, establish feasibility of new or modified computer applications, design systems, and participate continually in programming. Qualifications required: five years experience, including three in progressively responsible positions in data processing (bachelor's degree in computer science or other related fields may be substituted); one in systems analysis and design techniques, and one in work indicating knowledge of theoretical computer concepts and programming techniques and a thorough knowledge of complete computer hardware/software interface.

Supervisory Computer Operator---$17,000 per year**
(Operations Shift Leader)
Incumbent will supervise operation of all ADP equipment in the Computer Center's Data Processing Department for a particular shift. Qualifications required: two years general office work with experience operating office business machines and other machines, plus three years experience operating a computer system or peripherals devices used in support of computer operations; or four years computer training courses above the high school level, plus two years specialized experience; or any equivalent combination of experience, education and training.

Computer Operator---$13,815 per year**
Incumbent will operate the control console of a digital computer system and facilitate the accomplishment of goals and objectives of the Computer Center and efficient use of computer equipment. Qualifications required: two years general office work, with experience operating office business machines and other machines, plus one year experience operating a computer system or peripheral devices used in support of computer operations; or four years of computer training courses above high school level, plus one year specialized experience; or any equivalent combination of experience, education and training.

* A position paid with non-appropriated dollars; continued employment is subject to availability of funds.

** Persons selected for these positions will be required to be bonafide residents of the District of Columbia or become a resident within 180 days from effective date of appointment and maintain D.C. residency for the duration of employment. Failure to become a D.C. resident or maintain residency for duration of employment shall result in forfeiture of the position to which said person has been appointed.

Closing date for receipt of applications for all positions listed above is July 30, 1982. Submit professional application, resume or SF-171 with an indication of the position for which you are applying to:

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Bachelors Degree and three year's IBM systems programming experience and one year supervisor systems programming, detailed knowledge of the internal structure of various operating systems, proficiency in Assembler Language and several higher level languages.
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Minimum qualifications: A Bachelor's degree in an appropriate discipline (an advanced degree is highly desirable); 5 years computing experience, preferably in higher education, with strong background in management.

Salary is highly competitive and commensurate with education and experience. Deadline for applications is July 31, 1982. Candidates should send resume and letters of application to:

Mr. Craig McCoy
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The ideal candidate will possess a college degree, or equivalent, and at least 3 years' systems programming experience, with a minimum of 1 year's systems programming on DECsystem-10s. He or she should also have a solid working knowledge of MACRO-10 and one or more of the TOPS-10 languages. Familiarity with the TOPS-10 monitor and some CUSPs is a must.

Please send resume including salary requirements to Steve Turner, The Gillette Company, Prudential Tower, 37th Floor, Boston, MA 02199.

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Division of Information Systems
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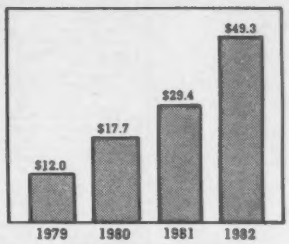

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UNIVERSITY OF WISCONSIN-WHITEWATER
TWO COMPUTING POSITIONS

ASSISTANT DIRECTOR-ADMINISTRATIVE COMPUTING
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UW-Whitewater is a state-supported University of 10,000 students located in the Kettle Moraine area of Southeast Wisconsin. The community of Whitewater, with a population of approximately 13,000, is located 40 miles from Madison, 50 miles from Milwaukee and 120 miles from Chicago.

The Center operates an IBM 4341 that serves both academic and administrative computing. The administrative terminal network consists of 50 terminals running under CICS, while a VAX 11/780 will be installed this summer to support a network of 80 academic terminals.

1. **ASSISTANT DIRECTOR-ADMINISTRATIVE:** A growth oriented professional for a new position at the assistant director level is being sought. Responsibilities include long and short range planning, management of administrative systems development, provision of technical leadership and supervision of the administrative services programming staff. The position will report to the Director of the Computer Center.
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2. **ACADEMIC COMPUTING SERVICES SPECIALIST:** Responsibilities include consultation with faculty and students on computing related activities, workshop presentation and program development in support of the academic community.
A Bachelor's degree in computer science or a related field and a minimum of three years experience with computing activities is required. Applicants with a strong language background (BAL, BASIC, COBOL, FORTRAN, PL/1) or those with a statistical background and experience with SAS or SPSS will be given preference. Salary is competitive.

APPLICATION

A complete application for either position consists of a cover letter and a current resume describing employment experience, salary history, and educational background. Candidates given final consideration will be asked to provide appropriate references and transcripts.
Apply by August 2, 1982 to: Computer Center Search and Screen Committees, University Computing Services, University of Wisconsin-Whitewater, Whitewater, WI 53190.
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University of New Mexico
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SOHIO

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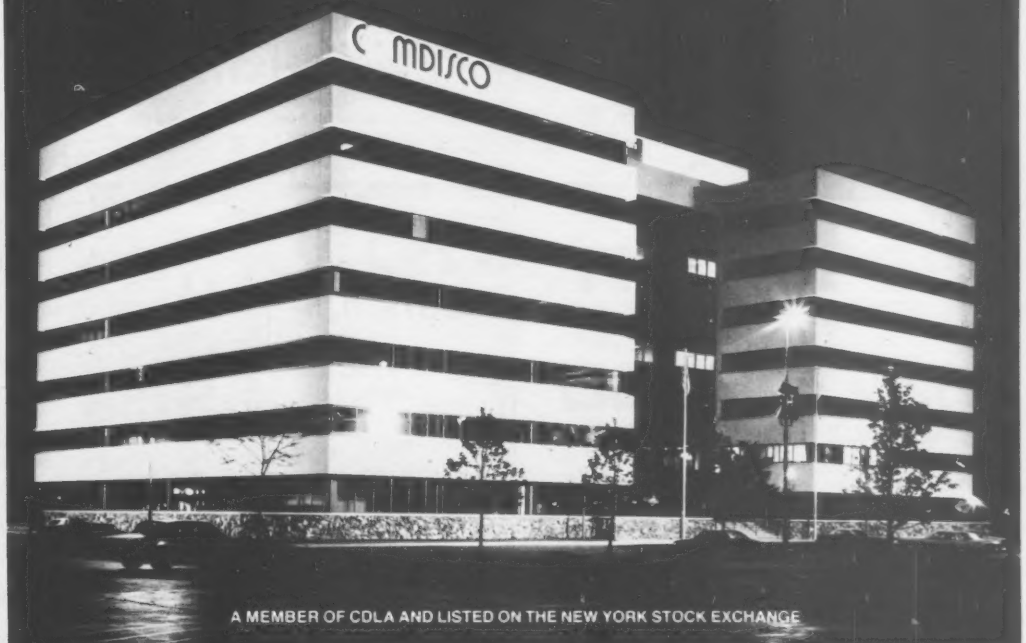

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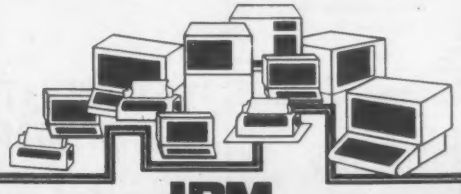

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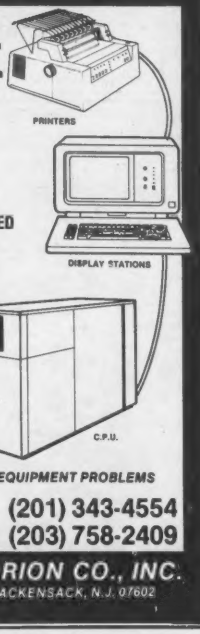

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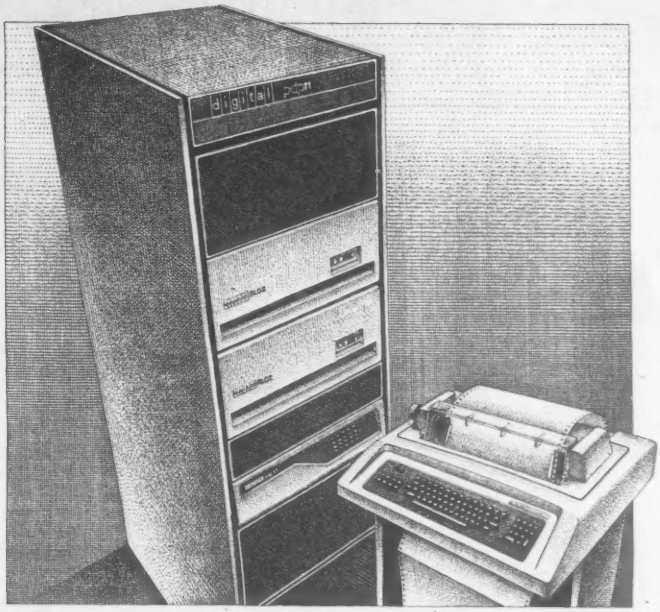

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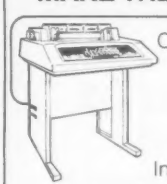

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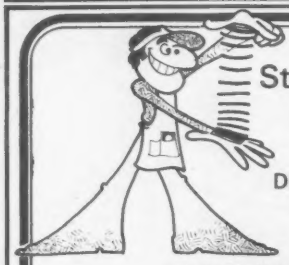

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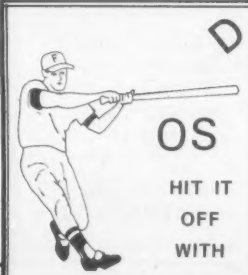

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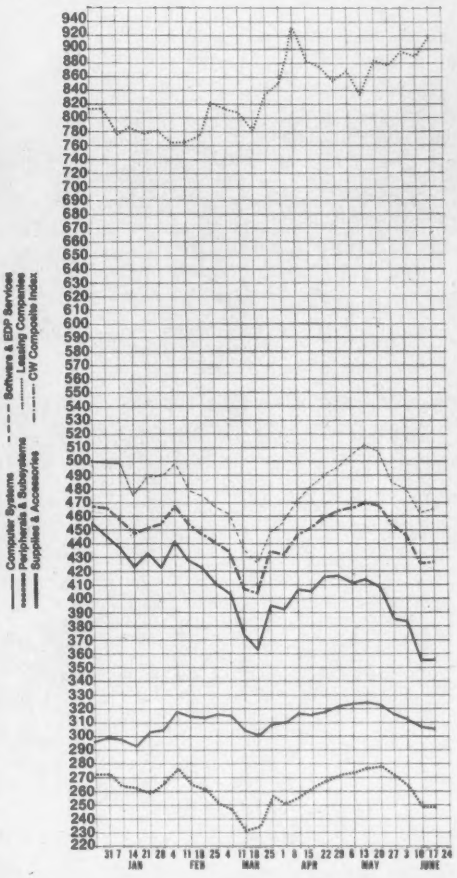

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N	BURROUGHS CORP	28- 72	32 1/8	- 3/8	-1.1
O	COMPUTER AUTOMATION	8- 28	8 1/8	+ 5/8	+8.3
N	CONTROL DATA CORP	19- 42	23 1/2	0	0.0
N	CRAY RESEARCH INC	20- 48	22 7/8	+2 3/4	+13.6
N	DATA GENERAL CORP	25- 87	25 5/8	0	0.0
N	DATAPOINT CORP	11- 68	11 1/4	-1 5/8	-12.8
N	DIGITAL EQUIPMENT	68-113	88 1/4	-1 1/8	-1.6
A	EECO INC	8- 18	8	+ 3/8	+4.8
N	ELECTRONIC ASSOC.	5- 13	7 1/2	+ 1/8	+1.6
N	FLOATING POINT SYST	13- 30	19 1/8	+ 1/8	+0.6
N	FOXBORO	31- 82	31 1/4	-2 5/8	-7.7
O	FULCRUM COMP GRP	1- 3	1/4	0	0.0
O	GENERAL AUTOMATION	3- 16	3 3/4	- 1/8	-3.2
N	HARRIS CORP	22- 60	22	-1 1/2	-6.3
N	HEWLETT-PACKARD CO	33- 54	40	- 3/8	-0.9
N	HONEYWELL INC	83-115	85 1/8	- 3/4	-1.1
N	IBM	49- 73	58 1/2	+1 3/8	+2.3
O	IPL SYSTEMS INC	6- 13	6 1/4	+ 1/4	+4.1
O	MAGNUSON COMP SYSTS	3- 32	3 1/8	+ 1/8	+4.1
N	MANAGEMENT ASSIST	9- 26	11 1/8	0	0.0
O	MINI-COMPUTER SYST	0- 4	1/2	- 1/8	-20.0
N	MODULAR COMPUTER SYS	7- 32	8	- 1/8	-1.5
N	MOHAWK DATA SCI	10- 32	9 3/4	- 1/4	-2.5
N	NCR	38- 76	51 1/4	+4 5/8	+8.9
N	PERKIN-ELMER	18- 38	17 3/4	- 1/4	-1.3
N	PRIME COMPUTER INC	17- 48	18 3/4	- 1/4	-1.3
N	SPERRY CORP	22- 85	22 1/2	- 1/2	-2.1
O	TANDEM COMPUTERS INC	13- 35	24 1/4	+ 1/4	+1.0
N	TEXAS INSTRUMENTS	71-151	82 3/8	+4 7/8	+6.2
A	WANG LABS.	22- 48	23 7/8	+1 1/8	+4.9
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	18- 28	22 1/2	0	0.0
N	COMDISCO INC	18- 27	17 3/8	- 1/2	-2.7
B	COMMERCE GROUP CORP	1- 2	5/8	+ 1/8	+25.0
O	COMPUTER INVSTRS GRP	1- 4	3/8	0	0.0
O	CONTINENTAL INFO SYS	4- 9	7 1/2	+ 5/8	+8.0
N	DPF INC	5- 13	8 3/4	+ 1/4	+2.9
O	ITEL	1- 15	3/4	0	0.0
O	LEASPAC CORP	1- 2	1/8	0	0.0
N	U.S. LEASING	18- 30	21 7/8	-1 5/8	-6.8

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH; B=BOSTON
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

E X C H		1981-82 RANGE (1)	CLOSE JUN 16 1982	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 6	1 1/2	0	0.0
O	ADVANCED SYSTEMS INC	10- 15	10 1/2	- 3/4	-6.6
O	ANACOMP INC	10- 18	11 1/2	+ 1/8	+1.0
O	ANALYSTS INTL CORP	3- 14	6 3/4	- 1/4	-3.5
A	APPLIED DATA RES.	13- 25	20	+1 1/4	+6.6
O	ASK COMPUTER SYSTEMS	11- 17	14 7/8	- 1/8	-0.8
B	ASTRADYNE COMP IND	2- 5	1 5/8	0	0.0
N	AUTOMATIC DATA PROC	22- 32	24 5/8	+ 3/4	+3.1
O	CGA COMPUTER ASSOC	4- 25	7 1/4	+1 1/2	+26.0
O	COMPUTER ASSOC INT'L	12- 20	17 1/4	0	0.0
O	COMPUTER HORIZONS	1- 5	1 3/4	0	0.0
O	COMPUTER NETWORK	4- 9	6 1/2	+ 1/8	+1.9
N	COMPUTER SCIENCES	11- 30	11 7/8	+ 1/8	+1.0
O	COMPUTER TASK GROUP	10- 23	10 1/2	0	0.0
O	COMPUTER USAGE	2- 10	2 1/4	0	-0.0
O	COMSERV CORP	8- 18	13 1/2	+ 1/2	+3.8
O	COMSHARE	8- 21	5 5/8	0	0.0
N	CULLINANE DATABASE	15- 37	27 1/2	-1	-3.5
O	DATA DIMENSIONS INC	0- 4	1/4	0	0.0
O	DATATAB	1- 4	3/4	+	+8.3
O	DSI CORP	4- 9	6 1/4	0	0.0
O	DYATRON CORP	2- 11	2 3/4	- 1/8	-4.3
N	ELECTRONIC DATA SYST	15- 30	25 3/4	-1 3/8	-5.0
O	INFORMATICS INC	10- 23	13 1/4	- 5/8	-4.5
O	INSYTE CORP	1- 3	2 3/4	0	0.0
O	IPS COMPUTER MARKET.	1- 4	1 1/4	0	0.0
O	KEANE ASSOCIATES	4- 8	4 1/4	0	0.0
A	LOGICON	12- 30	13	+ 3/8	+2.8
O	MNGT SCI AMER INC	17- 26	21 1/2	+ 3/4	+3.6
O	MATHEMATICA INC	12- 26	12 1/2	-2	-13.7
O	MATHEMATICAL APP GRP	14- 28	18	+1	+5.5
O	NATIONAL DATA CORP	14- 28	17	+ 1/8	+0.7
O	PANSOPHIC SYSTEMS	8- 15	11	0	0.0
N	PLANNING RESEARCH	5- 13	8 5/8	- 1/8	-1.8
O	PROGRAMMING & SYS	1- 2	1 3/8	0	0.0
O	REYNOLDS & REYNOLD	16- 26	20 1/4	0	0.0
O	SEI CORP	17- 28	24 1/4	+ 1/4	+1.0
O	SHARED MEDICAL SYST	25- 37	28	+ 1/2	+1.7
O	STSC INC	6- 28	8 5/8	0	0.0
O	SCIENTIFIC COMPUTERS	6- 16	7	+ 1/8	+1.8
O	SOFTWARE AG	7- 23	8 3/4	- 1/2	-8.8
N	TYMSHARE INC	16- 58	17 1/2	+ 1/8	+0.7
A	URS CORP	11- 18	12	+ 1/8	+1.0
N	WYLY CORP	7- 20	8 3/8	- 1/4	-2.8
	PERIPHERALS & SUBSYSTEMS				
N	AM INTERNATIONAL	1- 15	1 1/8	0	0.0
A	ANDERSON JACOBSON	5- 26	8 1/2	+ 1/2	+5.5
O	AUTO-TROL TECHNOLOGY	6- 62	11 3/4	+ 5/8	+5.6
O	BANCTEC INC	5- 35	8 1/4	- 1/2	-5.1
O	BEEHIVE INT'L	6- 18	8 5/8	- 1/4	-3.8
A	BOLT,BERANEK & NEW	9- 25	16 1/8	- 7/8	-5.1
O	CAMBEX CORP	2- 9	2 5/8	0	0.0
N	CENTRONICS DATA COMP	7- 40	9 5/8	+ 1/8	+1.3
A	CETEC CORP	4- 8	3 7/8	- 1/4	-8.0
O	COGNITRONICS	2- 11	3 1/8	- 1/4	-7.4
O	COMPUTER COMMUN.	1- 2	1/2	0	0.0

E X C H		1981-82 RANGE (1)	CLOSE JUN 16 1982	WEEK NET CHNGE	WEEK PCT CHNGE
A	COMPUTER CONSOLES	18- 28	21 1/4	- 5/8	-2.8
O	COMPUTER DEVICES INC	4- 10	7 1/4	+ 1/2	+7.4
O	COMPUTER TRANSCEIVER	3- 9	5	- 1/4	-4.7
N	COMPUTERVISION CORP	20- 48	28	- 3/8	-1.4
N	CONRAC CORP	17- 28	23 5/8	+ 1/4	+1.0
A	DATA ACCESS SYSTEMS	2- 13	2 3/4	0	0.0
A	DATAPRODUCTS CORP	17- 44	17	- 1/8	-0.7
O	DATARAM CORP	4- 15	7 1/8	- 1/4	-3.3
O	DATUM INC	2- 5	2 1/8	0	0.0
O	DAVID JAMISON CARLYL	3- 7	2 1/2	-1	-28.5
O	DECISION DATA COMPUT	3- 8	4 3/4	+ 3/8	+8.5
O	DELTA DATA SYSTEMS	2- 4	1 3/4	+ 1/4	+16.6
N	ELECTRONIC M & M	3- 8	3 7/8	+ 1/8	+3.3
O	EVANS & SUTHERLAND	18- 40	23 3/4	+ 1/2	+2.1
N	GEN'L DATA COMM IND	7- 19	8 1/8	+ 3/4	+8.8
O	GENERAL TERMINAL CP	0- 4	3/8	0	0.0
O	GREAT SOUTHWEST IND	1- 12	5	+ 1/4	+5.2
N	HAZELTINE CORP	18- 35	25	+ 1/4	+1.0
O	INFORMATION INTL INC	8- 17	11 1/4	+ 1/4	+2.2
O	INTEL CORP	21- 51	31 1/4	+3	+10.6
O	IPL SYSTEMS INC	5- 15	8 1/4	+ 1/4	+4.1
A	LUNDY ELECTRONICS	7- 18	10 1/4	+ 3/8	+3.7
A	MSI DATA CORP	11- 27	18 3/8	-1 1/8	-8.4
O	NETWORK SYSTEMS CORP	14- 25	18	+ 3/4	+4.1
O	OMEX	3- 8	3 1/2	0	0.0
N	PARADYNE CORP	25- 52	31 3/8	+ 1/4	+0.8
A	PENRIL CORP	7- 17	7 3/8	+ 1/8	+1.6
O	RAMTEK CORP	9- 23	17 1/2	+ 1/4	+1.4
N	RECOGNITION EQUIP	4- 21	4 1/4	0	0.0
O	SCAN DATA	1- 3	1 1/4	0	0.0
N	STORAGE TECHNOLOGY	18- 40	21 1/4	- 3/8	-1.7
O	SYKES DATATRONICS	8- 34	12 1/2	-1 1/4	-9.0
A	T BAR INC	8- 19	8 3/8	- 1/8	-1.3
A	TEC INC	4- 11	8 5/8	+ 1/8	+1.4
N	TEKTRONIX INC	43- 70	51 1/8	+1 3/8	+2.7
N	TELEX	5- 10	7 3/4	+ 1/8	+1.6
O	TESDATA SYSTEMS CP	3- 17	3 1/4	- 3/4	-18.7
A	TIMEPLEX INC	7- 18	10	+1	+11.1
O	VISUAL TECHNOLOGY	10- 15	10	- 1/4	-2.4
O	WILTEK INC	1- 3	1 1/8	- 1/8	-10.0
	SUPPLIES & ACCESSORIES				
N	AMERICAN BUS PRODS	11- 17	12 3/4	- 1/8	-0.9
O	BALTIMORE BUS FORMS	1- 2	1 1/4	0	0.0
N	BARRY WRIGHT	15- 24	14 3/4	-1	-6.3
O	CYBERNATICS INC	1- 2	1	0	0.0
A	DUPLEX PRODUCTS INC	12- 17	14 3/8	- 3/8	-2.5
N	ENNIS BUS. FORMS	15- 23	18 1/8	+ 3/4	+4.0
N	3M COMPANY	48- 65	51 1/2	+1 5/8	+3.2
O	MOORE CORP LTD	27- 38	28 3/4	-1 1/4	-4.4
N	NASHUA CORP	14- 33	14 3/8	- 5/8	-4.1
O	STANDARD REGISTER	30- 43	38 1/2	- 1/2	-1.2
A	TAB PRODUCTS CO	14- 30	14 3/4	+ 1/2	+3.5
N	WALLACE BUS FORMS	22- 36	30 1/8	+ 5/8	+2.1

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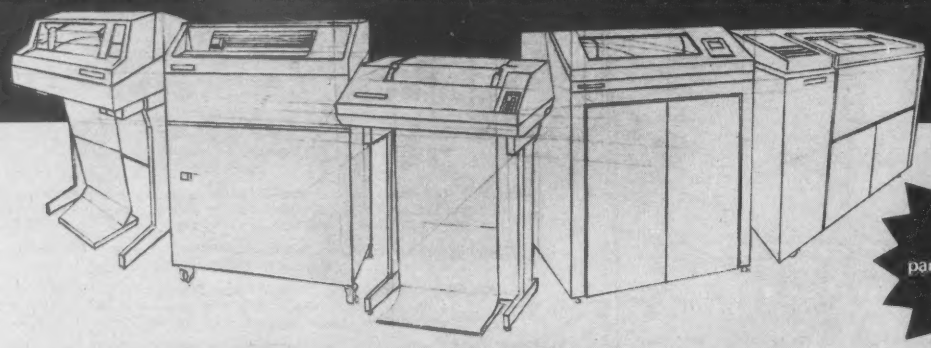

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